

**FINAL ENVIRONMENTAL IMPACT STATEMENT
AUTHORIZATION OF INCIDENTAL TAKE AND
IMPLEMENTATION OF THE LCRA TRANSMISSION
SERVICES CORPORATION HABITAT CONSERVATION PLAN**

U.S. FISH AND WILDLIFE SERVICE
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Austin, Texas 78757
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ABBREVIATIONS

Act	Endangered Species Act of 1973, as amended
Alternative A	Proposed Federal Action
Alternative B	Reduced Permit Duration
Alternative C	No Action Alternate
APLIC	Avian Power Line Interaction Committee
BEG	Bureau of Economic Geology
BGEPA	Bald and Golden Eagle Protection Act
BMPs	best management practices
CCN	Certificate of Convenience and Necessity
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
E&S	Erosion and sedimentation
EIA	U.S. Energy Information Administration
EIS	Environmental Impact Statement
EO	Executive Order
ERCOT	Electric Reliability Council of Texas
FPPA	Farmland Protection Policy Act
G3	Vulnerable Global Rank
G4	Apparently Secure Global Rank
G5	Secure Global Rank
G#G3	Range of Global Rank
HCP	Habitat Conservation Plan
HCP Handbook	Habitat Conservation Planning Handbook
ITP	Incidental Take Permit
ITS	Intelligent Transportation Systems
LCRA TSC	Lower Colorado River Authority Transmission Services Corporation
LE	Federally Listed Endangered
LT	Federally Listed Threatened
MBTA	Migratory Bird Treaty Act of 1918
NEPA	National Environmental Policy Act
NHLs	National Historic Landmarks
NHT	National Historic Trail
NHPA	National Historic Preservation Act
NL	Not Federally Listed
NMFS	National Marine Fisheries Service
NOI	Notice of Intent
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
O&M	operations and maintenance
PAD-US	Protected Area Database – U.S.
Permit Term	permit term of 30 years
Plan Area	241 Texas counties
Proposed Federal Action	Approval of the HCP and issuance of the requested ITP
PUC	Public Utility Commission of Texas

ROW	right-of-way
S1	Critically Imperiled State-listed Species
S2	Imperiled State-listed Species
S3	Vulnerable State-listed Species
S4	Apparently Secure Species
SEP HCP	Southern Edwards Plateau Habitat Conservation Plan
Service	U.S. Fish and Wildlife Service
SWCA	SWCA Environmental Consultants
SWPPP	Stormwater Pollution Prevention Plan
TCEQ	Texas Commission on Environmental Quality
TCOS	Transmission Cost of Service
TDC	Texas Demographic Center
THC	Texas Historical Commission
TPWD	Texas Parks and Wildlife Department
TWDB	Texas Water Development Board
USC	United States Code
USDA	U.S. Department of Agriculture
USGS	U.S. Geological Survey

CHAPTER 1. PURPOSE AND NEED

This Environmental Impact Statement (EIS) has been prepared in accordance with the requirements of the National Environmental Policy Act (NEPA) (42 United States Code [USC] 4321-4327) regarding the proposed issuance of an Incidental Take Permit (ITP) under section 10(a)(1)(B) of the Endangered Species Act of 1973, as amended (Act) to the Lower Colorado River Authority's Transmission Services Corporation (LCRA TSC). LCRA TSC is requesting incidental take coverage during construction, operation, upgrade, decommissioning, repair, and maintenance of existing and future electrical transmission lines, substations, access roads, and related facilities (Covered Activities) within 241 Texas counties (Plan Area) (Figure 1). LCRA TSC submitted a Habitat Conservation Plan (LCRA TSC HCP) that proposes to minimize and mitigate to the maximum extent practicable incidental take of 22 listed and 1 unlisted species (Covered Species) that, under certain circumstances, are likely to result from some Covered Activities within the Plan Area. LCRA TSC has requested a permit term of 30 years (Permit Term).

Section 9 of the Act prohibits "take" of wildlife species listed as endangered (16 USC 1538[a]). The U.S. Fish and Wildlife Service (Service) extended this take prohibition to most threatened wildlife species by regulation (50 Code of Federal Regulations [CFR] 17.31). Section 9 of the Act does not prohibit take of listed plants; however, section 9 makes it unlawful to "remove and reduce to possession" or "maliciously damage or destroy" listed plants from "areas under Federal jurisdiction," or to "remove, cut, dig up, or damage or destroy" listed plant species in violation of state criminal trespass law or knowing violation of any other state law (16 USC 1538[a][2]). "Take" of wildlife species is defined in section 3 of the Act as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct" (16 USC 1532[19]). Service regulation defines "Harm" as an "act which actually kills or injures wildlife. Such act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering" (50 CFR 17.3).

LCRA TSC is a nonprofit corporation that currently owns or operates approximately 5,200 miles of electric transmission lines and nearly 400 electric substations across the state of Texas. As with other electric transmission systems in Texas, LCRA TSC is regulated by the Public Utility Commission of Texas (PUC) and coordinates its operations with the Electric Reliability Council of Texas (ERCOT), which manages the power grid that serves most of the state. LCRA TSC monitors the projected growth in demand for electricity and works with its transmission customers and regulatory agencies to ensure reliable electric transmission service for residential, business, commercial and industrial power customers across Texas.

LCRA TSC's electric transmission lines and substations help provide reliable electric transmission service to power generators and are an integral part of the overall power system for residential, business, commercial, and industrial power customers across Texas. LCRA TSC constructs, operates, and maintains most of its facilities within linear corridors; substations and switching stations, which are typically situated on parcels of land that may contain several acres. LCRA TSC has the right, through land ownership, easements, access agreements, cooperative

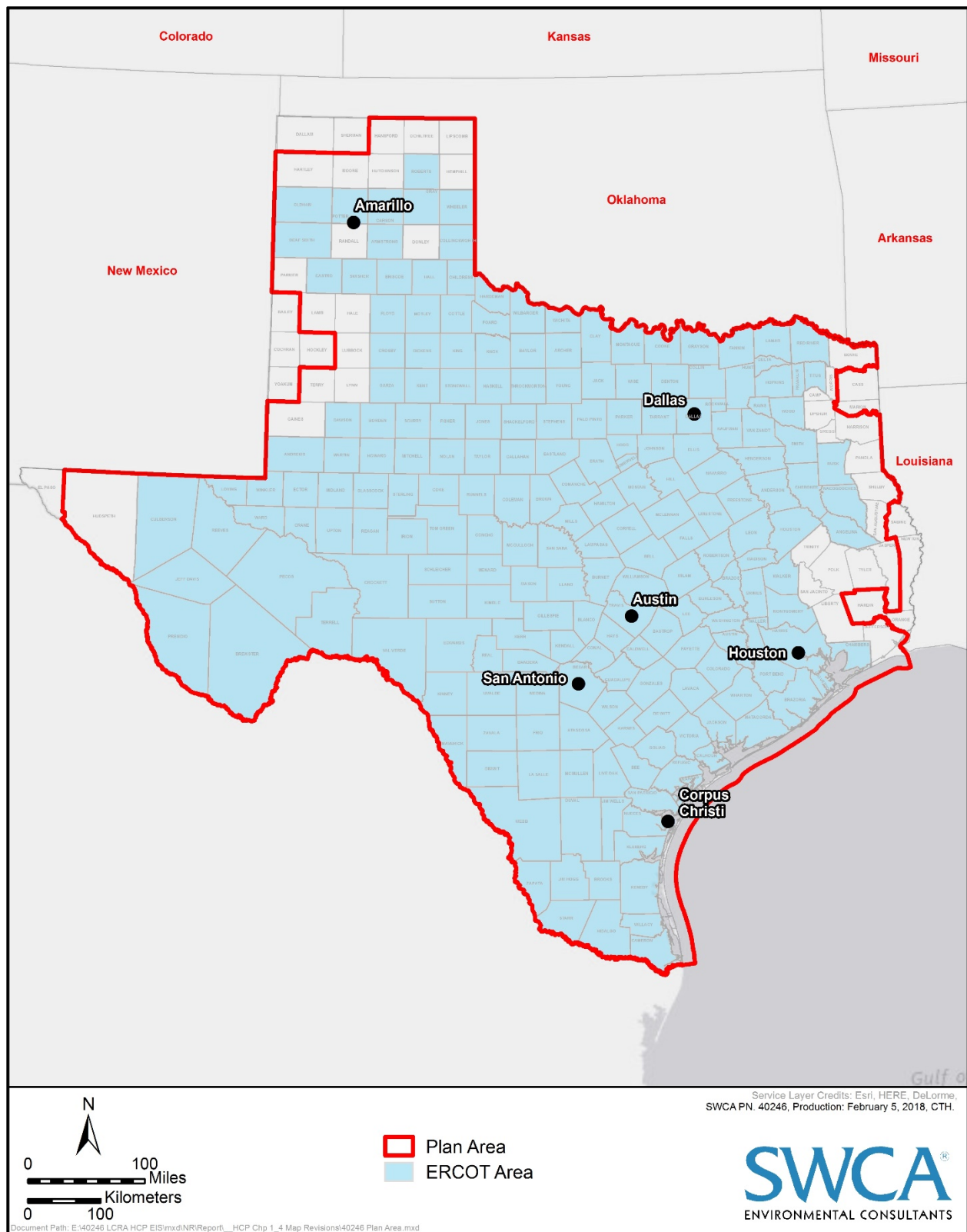


Figure 1. Plan Area location.

agreements with other agencies, or other means, to construct and maintain its facilities within these lands.

As described in Section 2.1.5 of this EIS, Covered Activities could incidentally take Covered Species via harm as defined by Federal regulation at 50 CFR 17.3. Incidental take via directly killing or wounding individuals is also possible, though not always expected, due to the application of LCRA TSC's proposed minimization measures. LCRA TSC's HCP (Chapter 4) describes in greater detail the Covered Activities associated with the requested ITP and the species-specific measures LCRA TSC would take to minimize and mitigate the impacts of the proposed taking of Covered Species to the maximum extent practicable (collectively, Conservation Measures; HCP Chapter 6 and Appendix D).

This EIS examines the impact the Service's approval of the LCRA TSC HCP and issuance of the requested ITP (Proposed Federal Action) could have on the human environment, as well as the impacts associated with a reasonable range of alternatives to the Proposed Federal Action.

1.1 Purpose and Need for the Proposed Federal Action

The purpose of the Federal action is to ensure that the Applicant's HCP includes all elements as required by section 10(a)(2)(A) and meets the criteria listed in section 10(a)(2)(B) of the Act. The Service's need for the proposed action is to respond to the Applicant's HCP and application for an ITP related to the Applicant's activities that have the potential to result in take of threatened and endangered species, pursuant to the ESA Section 10(a)(1)(B) and its implementing regulations and policies. Once the Service receives an application for an ITP, the Service must review the application to determine if it meets issuance criteria. The Service also evaluates the impacts of the issuance of the ITP and implementation of the LCRA TSC HCP pursuant to NEPA. If the HCP is consistent with issuance criteria, the Service must issue an incidental take permit to LCRA TSC to authorize incidental take of Covered Species that could, under certain circumstances, result from some Covered Activities during the Permit Term.

On October 1, 2018, the Service received an application from LCRA TSC for issuance of the ITP under the authority of section 10(a)(1)(B) of the Act. The LCRA TSC HCP and other supporting documentation accompanied the application. If the Service approves the application and issues the ITP, the ITP would authorize take of the Covered Species incidental to Covered Activities. The Service has prepared this EIS to: 1) inform the public of the Proposed Federal Action, 2) inform the public of the effects of the Proposed Federal Action on a range of reasonable alternatives, 3) seek information from the public, and 4) use information collected and analyzed to make informed decisions concerning the application for the ITP.

1.2 Decision to Be Made

Under provisions of the Act, the U.S. Secretary of the Interior (through the Service) shall issue an ITP if the application conforms to the following issuance criteria identified in section 10(a)(2)(B) of the Act:

- the taking will be incidental;

- the applicant will, to the maximum extent practicable, minimize and mitigate the impacts of such taking;
- the applicant will ensure that adequate funding for the LCRA TSC HCP will be provided;
- the taking will not appreciably reduce the likelihood of survival and recovery of the species in the wild;
- the applicant will ensure that other measures that the Service may require as being necessary or appropriate for the purposes of the LCRA TSC HCP will be provided; and
- the Service has received such other assurances as may be required that the LCRA TSC HCP will be implemented.

1.3 Public Involvement and Tribal Outreach

1.3.1 Scoping

The Service published a Notice of Intent (NOI) in the *Federal Register* on July 11, 2017 (92 FR 35539) to determine the scope of issues and alternatives to be addressed in the EIS. Publication of the NOI initiated a 30-day scoping period, during which the Service solicited comments regarding potential impacts associated with and identification of alternatives to the Proposed Federal Action that are addressed in the EIS. The Service held scoping meetings in Corpus Christi, Austin, Midland, and College Station, Texas, in August 2017, to give the public the opportunity to view information about the Proposed Federal Action and provide comments on the issues and alternatives that are addressed in the Service's NEPA environmental review document. The scoping comment period closed on August 30, 2017.

Nine individuals attended scoping meetings. The Service received two written comments regarding the proposed issuance of an ITP and its potential impacts. The Katy Prairie Conservancy generally had concerns with how LCRA TSC would approach project reviews with a one-size-fits-all approach rather than on a case-by-case basis and the National Park Service requested compliance with the National Historic Preservation Act (NHPA). The Service considered the scoping comments and worked with LCRA TSC to incorporate ideas into the HCP to detail how projects will be reviewed (Chapter 6 of the HCP) and how NHPA compliance will be addressed (Appendix A of the HCP).

1.3.2 Draft EIS Comment Period

The Service published a Notice of Availability (NOA) in the *Federal Register* on April 29, 2019 (84 FR 18075) for the draft EIS and LCRA TSC HCP. Publication of the NOA initiated a 45-day public comment period, during which the Service solicited comments regarding the Proposed Action, considered issues, and other alternatives disclosed in these two documents. The comment period closed on June 13, 2019. We received nine comments: one from the Texas Historical Commission with only minor editing suggestions, one from the Environmental Protection Agency with no comment, four from tribes, one from the Texas Parks and Wildlife Department, and two comments that were not substantive. The final EIS provides the comments, responses, and how they were addressed in Appendix B.

1.3.3 National Historic Preservation Act and Tribal Consultation

The National Historic Preservation Act (NHPA) requires, among other things, that “[t]he head of any Federal agency having direct or indirect jurisdiction over a proposed...federally assisted

undertaking...and the head of any Federal department or independent agency having any authority to license any undertaking...shall take into account the effect of the undertaking on any historic property” (54 USC 306018; hereafter, Section 106). The term “historic property” is defined by the NHPA as “any prehistoric or historic district, site, building structure, or object included on or eligible for inclusion on, the National Register, including artifacts, records, and material remains relating to the district, site, building, structure, or object” (54 USC 306108).

Appendix A to the Service’s Habitat Conservation Planning Handbook (HCP Handbook) provides guidance to the Service concerning compliance with the NHPA in connection with Service review of an application for an ITP (Service and National Marine Fisheries Service [NMFS] 2016). Appendix A to the HCP Handbook states that the Service considers the “undertaking” subject to NHPA compliance to be its “issuance of an [ITP] and the permittee’s covered activities described in the HCP under our direct jurisdiction” (Service and NMFS 2016). Appendix A to the HCP Handbook also provides further guidance on the specific steps associated with NHPA compliance, including defining the appropriate area of potential effects and assessing potential effects to historic properties, among others.

The NHPA also requires Federal agencies, in carrying out their responsibilities under Section 106, to “consult with any Indian tribe or Native Hawaiian organization that attaches religious and cultural significance” to “[p]roperties of traditional religious and cultural importance” that are eligible for the National Register of Historic Places (NRHP; 54 USC 302706). These properties may include those items distinguished under the Native American Graves Protection and Repatriation Act. Furthermore, the lead agency “shall acknowledge that Indian tribes and Native Hawaiian organizations possess special expertise in assessing the eligibility of historic properties that may possess religious and cultural significance to them” (36 CFR 800.4 [c][1]).

Because of the programmatic nature of the requested ITP, neither the Service nor LCRA TSC know the precise timing nor location of the Covered Activities or the conservation measures benefitting the Covered Species. The LCRA TSC HCP (Appendix A) describes the process LCRA TSC commits to implement with respect to Covered Activities to ensure impacts to cultural resources will be considered and addressed. By implementing these steps, LCRA TSC would assist the Service in sufficiently considering the effects of an undertaking on historic properties pursuant to Section 106.

Following publication of the NOI, and in recognition of the requirements of the NHPA, NEPA, and the guidance contained in Appendix A to the HCP Handbook, on June 22, 2017, the Service provided three federally recognized tribes with lands in Texas (Alabama-Coushatta Tribe of Texas, Kickapoo Traditional Tribe of Texas, and Isleta Del Sur Pueblo of Texas) and 24 federally recognized tribes identified by the Texas Historical Commission (THC) as having interests in Texas with an additional written notification and an invitation to consult on the proposed issuance of the ITP to LCRA TSC under NEPA and the NHPA. No tribal government representatives attended the scoping meetings. However, as of September 19, 2017, the Service received written responses from one federally recognized tribe with lands in Texas and four tribes identified by the THC as having interests in Texas:

- Cherokee Nation: Ms. Elizabeth Toombs, Tribal Historic Preservation Office

- Osage Nation: Mr. John Fox, Tribal Historic Preservation Office
- United Keetoowah Band of Cherokee Indians: Ms. Karen Pritchett, Tribal Historic Preservation Office
- Kickapoo Traditional Tribe of Texas: Ms. Bessie R. Scott, KTTT Legal Department, Traditional Council
- Comanche Nation: Mr. Theodore E. Villicana, Historic Preservation Office

The Cherokee Nation and the United Keetoowah Band of Cherokee Indians in Oklahoma requested to be consulting parties (the Consulting Parties) with respect to potential impacts to cultural resources that may occur in connection with the Service's issuance of the ITP.

On April 18, 2018, the Service sent letters to all of the tribes notifying them of our intent to prepare an EIS and acknowledging the two consulting parties and soliciting review and input concerning the process for identification, assessment of effects on, and treatment of cultural and historic resources set forth in LCRA TSC HCP Appendix A. We received comments from four tribes.

- Delaware Nation: Dana Kelly Historic Preservation/106 Assistant
- Osage Nation: Bobi Deere, Historic Preservation Office
- Ysleta del sur Pueblo: Javier Loera, Tribal Council/Tribal Historic Office
- Choctaw Nation of Oklahoma: Lindsey Bilyeu, Senior Compliance Review Officer

The Choctaw Nation of Oklahoma requested to be a consulting party and the other tribes had no comment.

CHAPTER 2. PROPOSED FEDERAL ACTION AND ALTERNATIVES

Sections 2.1 to 2.3 describe the three alternatives (Alternative A, the Proposed Federal Action; Alternative B, Reduced Permit Duration; and Alternative C, No Action Alternative) developed for consideration in this EIS. The Service considered but eliminated several additional alternatives from detailed evaluation, which we summarize in Section 2.4.

2.1 ALTERNATIVE A – Issuance of Section 10(a)(1)(B) Permit (Proposed Federal Action)

Alternative A is the Proposed Federal Action. Authorization of incidental take of Covered Species under this alternative, as described in LCRA TSC HCP Chapter 5, are evaluated in terms of the direct and indirect modification of Covered Species habitat. With the issuance of a section 10(a)(1)(B) ITP, LCRA TSC would implement the LCRA TSC HCP to minimize and mitigate the impacts of its incidental take to the maximum extent practicable, as summarized in Section 2.1.8, below. The LCRA TSC HCP (Chapter 4) details the Covered Activities; however, we briefly describe them below.

2.1.1 New Construction

LCRA TSC constructs new facilities. The PUC governs the process of determining where, when, or if new transmission lines and substations will be located and is not within the control of LCRA TSC or the Service. Once the route or site for a new facility is established, new construction involves a set of pre-construction, construction-phase, and post-construction activities such as:

- Land survey
- Pre-construction investigations
- Access road construction or improvement
- Erosion and sedimentation (E&S) controls
- Vegetation clearing
- Surface grading, trenching, and boring
- Installation of structures
- Post-construction restoration

New construction-related activities typically involve new right-of-way (ROW) on previously unmodified lands. However, some new facilities may be co-located with other existing facilities, such as utility lines or roads, and make use of previously modified lands with prior surface or subsurface disturbances. The schedule for completing a new construction project typically involves 4 to 5 years, from conception to energizing.

2.1.2 Upgrading and Decommissioning

Over time, LCRA TSC may modify existing structures to add a new circuit to an existing “double-circuit capable” structure, rebuild an existing transmission line by replacing structures or conductors/wires, expand an existing site-based support facility, or decommission (i.e., remove) a structure entirely. Upgrading and decommissioning activities involve many of the same types of activities as described for new construction. This class of LCRA TSC Activity does not involve the routing or siting process and largely involves existing, previously disturbed ROWs.

The schedule for completing an upgrading or decommissioning project, from conception to completion, typically involves 1 to 3 years.

2.1.3 Operations and Maintenance

LCRA TSC is responsible for the routine, regularly scheduled operations and maintenance (O&M) actions to ensure the reliability of its public utility facilities. Covered Activities related to O&M facilities include, but are not limited to:

- Vegetation management
- Patrols and inspections
- Hardware replacement
- Reconductoring (replacing the conductor or wire on a transmission line)

Unlike construction activities, most O&M activities involve low levels of human activity (e.g., patrols and inspections, and hardware replacement) or are infrequent (e.g., reconductoring or rewiring).

2.1.4 Emergency Responses

Given the nature of LCRA TSC's facilities, emergencies may arise that could have detrimental and potentially life-threatening consequences. To protect human health and safety LCRA TSC responds promptly to all emergencies, takes every action necessary, and quickly restores disrupted, essential utility services. Weather or other natural hazards are the most common trigger for emergency response. Emergencies, regardless of cause, may require the replacement of structures, reconductoring, vegetation clearing for new access routes or laydown/set-up areas, and similar activities. Therefore, emergency responses involve aspects of the three other classes of Covered Activities. Where practicable, LCRA TSC conducts emergency response activities within existing ROWs. However, in some instances, emergency responses may require actions outside of these areas.

2.1.5 Covered Activities

The EIS uses the term "Covered Activity" to describe one or more Covered Activities performed within a specific geographic area during a specific time, and for which LCRA TSC would use the HCP and ITP to authorize incidental take of one or more Covered Species. It is important to note that most Covered Activities would not affect Covered Species; only those activities likely to cause incidental take and for which incidental authorization is not obtained pursuant to a separate ITP or consultation pursuant to section 7 of the Act would become Covered Activities.

2.1.6 Geographic Extent and Distribution of Covered Activities

We provide a summary of theoretical maximum estimated disturbance of land (not limited to potential Covered Species habitat) from Covered Activities in Table 1. For purposes of estimating the total acres of theoretical maximum estimated disturbance that could occur during the Permit Term as a result of Covered Activities, LCRA TSC projected future disturbance across both land that has not been previously modified (i.e., construction of a new transmission line that crosses undeveloped woodlands or native grassland) and land that has been previously modified by development, intensive agriculture, or other facilities. The LCRA TSC HCP (Chapter 4) provides details regarding the disturbance estimation method and assumptions.

Table 1. Estimated Extent of Disturbance Associated with Covered Activities over ITP Term

Covered Activities	Surface Disturbance (total acres)		Subsurface Disturbance (total acres)	
	Previously Modified Lands	Previously Unmodified Lands	Previously Modified Lands	Previously Unmodified Lands
New Construction	13,296	31,025	2,040	4,760
Upgrading and Decommissioning	12,473	3,118	1,969	492
Operations and Maintenance*	148,980	-	25,944	-
Emergency Responses†	-	-	-	-
TOTAL	174,749	34,143	29,953	5,252

*Assumes Operations and Maintenance activities occur across the entire network of LCRA TSC Facilities 6 times over the 30-year ITP Term.

†LCRA TSC accounts for Emergency Responses within the other classes of Covered Activities and does not provide separate estimates for Disturbances associated with Emergency Responses.

Covered Activities would not occur evenly across the Plan Area over the ITP Term. Instead, LCRA TSC expects some parts of the Plan Area to receive more or less estimated disturbances from some activities than other parts. Table 2 estimates the maximum theoretical extent of disturbances from Covered Activities by Activity Zone, as described in further detail in LCRA TSC HCP Chapter 4.3.2.

Table 2. Estimated Geographic Distribution of Theoretical Maximum Disturbance of Land by Activity Zone

Activity Zone	Surface Disturbance (total acres)		Subsurface Disturbance (total acres)	
	Previously Modified Lands	Previously Unmodified Lands	Previously Modified Lands	Previously Unmodified Lands
Existing Facilities	85,759	17,056	14,625	2,629
Future Growth	2,898	558	499	86
Adjoining	45,398	8,742	7,813	1,342
Outside ERCOT	1,660	319	286	49
Other Counties	39,034	7,468	6,730	1,146
TOTAL	174,749	34,143	29,953	5,252

2.1.7 Plan Area

The Plan Area covers nearly 163 million acres, or approximately 95 percent of the state (see Figure 1, as well as LCRA TSC HCP Table 1) and encompasses all areas in which LCRA TSC currently operates transmission facilities or could construct or acquire transmission facilities in the future. The Plan Area also includes the area where authorized incidental take and implementation of Conservation Measures could occur.

2.1.8 Conservation Program

LCRA TSC and the Service engaged in extensive discussions concerning the Conservation Program, which consists of minimization and mitigation measures to ensure that they are consistent with section 10(a)(1)(B) permit issuance criteria (16 U.S.C. 1539[a][2][B] and 50 C.F.R. 17.22[b]). The LCRA TSC HCP (Chapter 6) provides a detailed description of the minimization and mitigation measures.

2.1.8.1 MINIMIZATION MEASURES

Under the Proposed Federal Action, LCRA TSC would voluntarily commit to implement the following general measures as part of its Conservation Program for Covered Activities (see LCRA TSC HCP Chapter 6.4.1 for additional details):

- Annual training to LCRA TSC staff and contractors working on Covered Activities regarding the implementation of the LCRA TSC HCP.
- Clearing or management of vegetation within ROWs using aboveground means when practicable to minimize surface and subsurface disturbances.
- Marking sections of new transmission lines that cross major rivers when Covered Activities involve new construction or significant upgrades, because certain avian species may preferentially use rivers as movement corridors.
- Marking sections of transmission lines that occur within 1 mile of potential migration stopover habitat for whooping cranes (*Grus americana*), limited to Covered Activities that overlap with portions of the Plan Area that occur within the whooping crane “80-mile” migration corridor, and those sections of transmission lines that occur within Critical Habitat for the piping plover (*Charadrius melodus*).
- Limiting herbicide applications to only woody vegetation (rather than broad scale use) that is a potential threat to the reliability of LCRA TSC facilities and implementation of the Service’s Southwest Region guidance for pesticide applications (Service 2007), as well as limiting herbicide and pesticide use within the habitats of certain Covered Species.
- Revegetation and restoration of disturbed areas to preconstruction contours with a seed mix certified by the U.S. Department of Agriculture (USDA) and approved by the landowner.
- Avoiding or minimizing subsurface disturbance and removal of woody vegetation within wetlands, riparian areas, and aquatic habitats.
- Annually hold a coordination meeting with the Service to obtain Covered Species occurrence data, as well as previously documented locations of federally listed plants and plants proposed for Federal listing.
- Avoiding subsurface disturbance within 50 feet of:
 - the entrance or footprint (if known) of a karst feature known or assumed to be occupied by one or more of the Covered Terrestrial Karst Invertebrates,
 - a spring outlet or associated spring run or lake or, where applicable, a well with known or assumed occupancy by one or more aquatic Covered Species, and
 - previously documented locality of federally listed plants and plants proposed for Federal listing,
 - as well as minimizing, to the extent possible, the removal of woody vegetation from the same areas. LCRA TSC would, to the extent practicable, set mowing heights in such areas to the approximate aboveground height of affected plant species.
- Use of E&S controls as required by the Texas Commission on Environmental Quality (TCEQ) or local ordinances to address stormwater discharges during construction.
- Specific measures described in Chapter 6.4.1 of the LCRA TSC HCP for listed and proposed listed plant species.

In addition, LCRA TSC would, in most circumstances, also implement specific minimization measures for Covered Species that are associated with a Covered Activity (see LCRA TSC HCP Chapter 6.4.2) in portions of the ROW that contain suitable or occupied habitat. Specific minimization measures would include, as applicable, practices such as:

- seasonal or time-of-day restrictions,
- geographic restrictions around sensitive breeding sites or other important habitat features,
- use of environmental monitors to ensure proper implementation of minimization measures,
- oak wilt prevention,
- speed limits on ROWs,
- minimum mowing heights,
- materials and lighting management,
- temporary salvage collection and relocation or release of Covered Species, and
- seed mixes for revegetation.

2.1.8.2 MITIGATION MEASURES

Authorized Incidental Take

Table 3 presents the maximum incidental take, by species, that would be authorized under the ITP. The actual number of acres directly or indirectly modified by Covered Activities within areas of occupied or suitable habitat may be less, but would not be more than those identified in Table 3. If the amount of incidental take associated with any Covered Activity had the potential to exceed the maximum amount of incidental take authorized by the ITP for one or more of the Covered Species, then LCRA TSC would be required to comply with the Act by other means. LCRA TSC HCP (Chapter 5) provides details on incidental take estimation methods and assumptions. For the purposes of the HCP, LCRA TSC based incidental take of Covered Species on the amount of potential Covered Species habitat potentially impacted by Covered Activities. Impacts to habitat, therefore, are used as a surrogate by which to measure incidental take of Covered Species (see LCRA TSC HCP Chapter 5.2.1 for further discussion).

Table 3. Maximum Theoretical Incidental Take Authorized under ITP

Covered Species	Take Estimate (acres)
BIRDS	
Golden-cheeked warbler (<i>Setophaga chrysoparia</i>)	8,396 acres
Whooping crane (<i>Grus americana</i>)	1,973 acres
Piping plover (<i>Charadrius melodus</i>)	129 acres
Rufa red knot (<i>Calidris canutus rufa</i>)	129 acres
Red-cockaded woodpecker (<i>Picoides borealis</i>)	528 acres
AMPHIBIANS	
Houston toad (<i>Anaxyrus houstonensis</i>)	1,024 acres
Barton Springs salamander (<i>Eurycea sosorum</i>)	5 acres
Georgetown salamander (<i>Eurycea naufragia</i>)	3 acres
Jollyville Plateau salamander (<i>Eurycea tonkawae</i>)	16 acres
Salado Springs salamander (<i>Eurycea chisholmensis</i>)	1 acre
San Marcos salamander (<i>Eurycea nana</i>)	2 acres
REPTILES	
Spot-tailed earless lizard (<i>Holbrookia lacerate</i>)	1,750 acres
MAMMALS	
Ocelot (<i>Leopardus pardalis</i>)	230 acres
INVERTEBRATES	

Covered Species	Take Estimate (acres)
Comal Springs riffle beetle (<i>Heterelmis comalensis</i>)	1 acre
Peck's Cave amphipod (<i>Stygobromus pecki</i>)	1 acre
Bee Creek Cave harvestman (<i>Texella reddeni</i>)	88 acres
Tooth Cave spider (<i>Neoleptoneta myopica</i>)	10 acres
Tooth Cave ground beetle (<i>Rhadine persephone</i>)	14 acres
Madla Cave meshweaver (<i>Cicurina madla</i>)	10 acres
Government Canyon Bat Cave spider (<i>Neoleptoneta microps</i>)	10 acres
Helotes mold beetle (<i>Batrissodes ventyvi</i>)	10 acres
[no common name] Beetle <i>Rhadine exilis</i>	10 acres
[no common name] Beetle <i>Rhadine infernalis</i>	10 acres

Mitigation

For incidental take authorized under the ITP and associated with Covered Activities, LCRA TSC will provide such mitigation in accordance with the provisions of the HCP.

In most cases, implementation of mitigation will occur prior to the start of Covered Activities. However, in rare cases, LCRA TSC could implement mitigation after a Covered Activity has begun. Changed circumstance addresses this process (see Chapter 9.1.9 of the LCRA TSC HCP for details).

Mitigation would involve the following types of conservation actions that generate a certain amount of conservation credit, as described further in LCRA TSC HCP Chapter 6.5.1.2:

1. **Protection and Maintenance of Suitable Habitat on New Conservation Lands**—This form of mitigation would involve establishing new permanent protections on lands that contain Suitable Habitat with at least some level of documented occupancy for one or more Covered Species (except that the expectation for demonstrated occupancy may be waived by the Service on a case-by-case basis). This form of mitigation would generate one Conservation Credit for each acre of Suitable Habitat newly protected and maintained in its baseline condition in perpetuity.
2. **Creation of Suitable Habitat on Existing Conservation Lands**—Previously protected lands (such as parks, preserves, or other forms of dedicated open space that may be protected from development but are not explicitly dedicated as conservation lands for a Covered Species) may offer opportunities for the creation of new acres of suitable habitat for a Covered Species. This form of mitigation would generate one conservation credit for each acre of suitable habitat created and maintained in perpetuity on previously protected lands.
3. **Case-by-case Conservation Credit Approvals**—LCRA TSC anticipates that the Service may grant conservation credit for other forms of conservation actions on a case-by-case basis, such as recovery actions identified in species status assessments, recovery plans, 5-year status reviews, or best available science regarding threats to or needs of a species. Service guidance also identifies other means of generating conservation credits, such as the partial credit given to the creation of “buffer areas” in some species-specific mitigation guidance and conservation banking policy (i.e., Service 2003a, 2013a). We expect this option will be rare and limited to circumstances where practicable habitat-based conservation actions are not available or do not address the most significant conservation needs of the Covered Species.

Subject to other priorities for delivery of mitigation (see Chapter 6.5.2 of the LCRA TSC HCP) and species-specific conservation priorities (see Chapter 6.5.3 of the LCRA TSC HCP and Appendix D), LCRA TSC would prioritize conservation actions performed in the order of the above list. The delivery of mitigation by LCRA TSC would involve one or more of the following options, in order of preference: 1) Service-approved conservation banks; 2) Service-approved in-lieu fee programs; 3) third-party conservation providers implementing Service-approved conservation actions; or 4) permittee-implemented Service-approved conservation actions. The LCRA TSC HCP (Chapter 6.5.2) provides details regarding these delivery mechanisms.

2.1.9 Plan Administration

LCRA TSC would request a meeting with the Service each year to discuss upcoming Covered Activities, updated distribution or occurrence information for Covered Species, opportunities for Advance Mitigation, and/or other concerns. LCRA TSC anticipates that the annual coordination meetings would occur in May or June, after the finalization of LCRA TSC's fiscal year business plan and corresponding with the start of LCRA TSC's fiscal year.

During the Permit Term, the Service's Austin Ecological Services Field Office would receive a report of LCRA TSC HCP-related activities from LCRA TSC by September 1 of each year. This annual report would document compliance with the terms and conditions of the ITP and include:

- evaluations of covered activities;
- incidental take ledger;
- mitigation funding ledger;
- documentation of mitigation actions;
- progress and close-out statements for Covered Activities;
- updated conservation credit cost estimates; and
- changed circumstances.

The LCRA TSC HCP (Chapter 8) provides details on this topic.

2.1.10 Funding

LCRA TSC would provide "... the funding that will be available to implement such steps" (16 USC 1539[a][2][A][ii]) as are specified in LCRA TSC's HCP prior to the occurrence of any authorized incidental take associated with a Covered Activity. With annual operating revenues of more than \$400 million, LCRA TSC is financially capable of ensuring proper implementation of the LCRA TSC HCP, including planning, management, and completion of the Conservation Program. LCRA TSC would fund its mitigation obligations through its existing financial management policies and programs, which include development and approval of annual and long-term business and capital plans that are comprehensive and guide LCRA TSC's financial strategy to fund capital projects and operating costs using a combination of earned revenues and debt financing. Many costs associated with implementing the LCRA TSC HCP would be borne by LCRA TSC's normal staffing and operations, such as costs for HCP administration, evaluating Covered Activities, and implementing general and specific minimization measures for Covered Species associated with Covered Activities. The LCRA TSC HCP does not include cost estimates for operational aspects, as they are activities that are consistent with or extensions of LCRA TSC's current operations.

LCRA TSC would seek rate recovery for the costs of implementing the LCRA TSC HCP through Transmission Cost of Service (TCOS) rate cases and interim TCOS updates before the PUC. For Covered Activities that involve acquisition of a Certificate of Convenience and Necessity (CCN) from the PUC (mainly New Construction), LCRA TSC would identify and provide estimated costs of implementing the LCRA TSC HCP in the applications for CCNs to the PUC.

LCRA TSC estimated the approximate cost per conservation credit for each Covered Species, which ranges from \$3,082 to \$8,040. However, these are not considered maximums. LCRA TSC HCP Chapter 7.2 provides details regarding the cost estimate approach and contingency funding.

2.1.11 Changed Circumstances

The LCRA TSC HCP identifies provisions to address potential changes in circumstances that could affect Covered Species (e.g., a change in listing status). If circumstances were to change, LCRA TSC would implement the changed circumstances provisions included in the LCRA TSC HCP (Chapter 9).

2.2 ALTERNATIVE B – Reduced Permit Duration

Under Alternative B, the Service would issue a section 10(a)(1)(B) ITP for a term of 15 years (from the date of issuance) to LCRA TSC to authorize incidental take of Covered Species that could result from Covered Activities. The Service could choose to renew the ITP for another term. This alternative would implement all minimization (Section 2.1.8.1) and mitigation (Section 2.1.8.2) measures identified for the Proposed Federal Action, but for a shorter permit duration. A reduced permit duration would also reduce the total amount of incidental take authorized for most species (Table 4), while still providing a streamlined permit process to LCRA TSC during the ITP duration. However, projects extending beyond the 15-year permit could require additional permitting, if coverage is not available to LCRA TSC under other avenues, such as a separate regional plan.

Table 4. Maximum Theoretical Incidental Take Authorized under Alternative B

Covered Species	Incidental Take Estimate (acres)*
BIRDS	
Golden-cheeked warbler (<i>Setophaga chrysoparia</i>)	4,198 acres
Whooping crane (<i>Grus americana</i>)	987 acres
Piping plover (<i>Charadrius melodius</i>)	65 acres
Rufa red knot (<i>Calidris canutus rufa</i>)	65 acres
Red-cockaded woodpecker (<i>Picoides borealis</i>)	264 acres
AMPHIBIANS	
Houston toad (<i>Anaxyrus houstonensis</i>)	512 acres
Barton Springs salamander (<i>Eurycea sosorum</i>)	3 acres
Georgetown salamander (<i>Eurycea naufragia</i>)	2 acres
Jollyville Plateau salamander (<i>Eurycea tonkawae</i>)	8 acres
Salado Springs salamander (<i>Eurycea chisholmensis</i>)	1 acre
San Marcos salamander (<i>Eurycea nana</i>)	1 acre
REPTILES	
Spot-tailed earless lizard (<i>Holbrookia lacerate</i>)	875 acres
MAMMALS	
Ocelot (<i>Leopardus pardalis</i>)	115 acres

Covered Species	Incidental Take Estimate (acres)*
INVERTEBRATES	
Comal Springs riffle beetle (<i>Heterelmis comalensis</i>)	1 acre
Peck's Cave amphipod (<i>Stygobromus pecki</i>)	1 acre
Bee Creek Cave harvestman (<i>Texella reddelli</i>)	44 acres
Tooth Cave spider (<i>Neoleptoneta myopica</i>)	5 acres
Tooth Cave ground beetle (<i>Rhadine persephone</i>)	7 acres
Madla Cave meshweaver (<i>Cicurina madla</i>)	5 acres
Government Canyon Bat Cave spider (<i>Neoleptoneta microps</i>)	5 acres
Helotes mold beetle (<i>Batrissodes ventyivi</i>)	5 acres
[no common name] Beetle <i>Rhadine exilis</i>	5 acres
[no common name] Beetle <i>Rhadine infernalis</i>	5 acres

* Rounded to nearest acre.

2.3 ALTERNATIVE C – No Action Alternative

Under the no action alternative, the Service would not issue the requested ITP and LCRA TSC would not implement the Conservation Program described in the HCP. Nevertheless, LCRA TSC is still required to comply with relevant local, state, and Federal laws, including the Act. Therefore, with respect to complying with the Act, LCRA TSC would seek an individual ITP, or where a Federal nexus existed, incidental take authorization pursuant to section 7 of the Act on a project-by-project basis for activities likely to result in incidental take of federally listed species. This approach would be fiscally burdensome and inefficient for both LCRA TSC and the Service. Any delays in project construction could jeopardize LCRA TSC's ability to provide efficient, safe, and reliable service to its customers, resulting in additional costs to consumers and a potential for human safety concerns. The project-by-project compliance approach could also result in isolated, independent areas of mitigation that would not be as productive or beneficial for the Covered Species. Moreover, reviewing each of LCRA TSC's projects over the 30-year life of the requested ITP would result in a tremendous burden on the Service's resources.

2.4 Alternatives Eliminated from Further Analysis

NEPA regulations (40 CFR 1502.14[c]) require consideration of "reasonable" alternatives, even if outside the legal jurisdiction of the lead agency, but those alternatives must be practical or feasible from the technical and economic standpoint and use common sense. Because of coordination between the Service and LCRA TSC during the development of the LCRA TSC HCP, we generated a wide range of alternatives for consideration. The majority of alternatives considered but dismissed from detailed analysis were related to alternatives to LCRA TSC's proposed approach—such as changes to Plan Area, Covered Species, or Covered Activities—but that would still meet issuance criteria.

2.4.1 Reduced Plan Area

Under this alternative, LCRA TSC would restrict the Plan Area to lands containing existing LCRA TSC facilities (see Table 2). This alternative would meet all current LCRA TSC needs and likely reduce the total amount of incidental take authorized, but would not capture any potential future service expansion during the ITP term. Therefore, the alternative would not adequately address LCRA TSC's purpose and need for regulatory and operational certainty in the coming years. Given the programmatic nature of the HCP, LCRA TSC does not know the locations of all Covered Activities at this time. Therefore, excluding portions of the Plan Area

would likely result in the need for additional permits, which would be burdensome to both LCRA TSC and the Service due to time and effort spent in obtaining/issuing these additional permits. Any delays in construction of projects resulting from additional permitting needs could jeopardize LCRA TSC's ability to provide efficient, safe, and reliable services to its customers. For these reasons, the Service has determined that a reduced plan area is not a reasonable alternative for consideration in this EIS.

2.4.2 Fewer Covered Activities

Under this alternative, LCRA TSC would exclude one or more Covered Activities addressed under the LCRA TSC HCP, as compared to the Proposed Federal Action. This alternative would reduce the total amount of incidental take authorized but because actions associated with all of the Covered Activities—from construction to O&M and emergency repair—have the potential to cause incidental take of listed species, excluding one or more categories of Covered Activities would not remove the possibility that incidental take would occur in connection with any such activities. Thus, LCRA TSC would still likely require further incidental take authorization to comply with the Act, which would require further expenditure of time and resources by the Service to respond to each incidental take authorization request. Additional project-specific incidental take authorization likely would result in delays in construction, operation, or maintenance of projects and, therefore, could jeopardize LCRA TSC's ability to provide efficient, safe, and reliable services to its customers. For these reasons, the Service has determined that including fewer Covered Activities is not a reasonable alternative for further consideration in this EIS.

2.4.3 Additional Covered Species

LCRA TSC and the Service considered increasing the list of Covered Species addressed by the LCRA TSC HCP to include additional species that both are and are not currently federally listed or petitioned for listing. While initially LCRA TSC did consider covering a host of additional federally listed species, after further analysis it was determined that the additional Covered Species considered were also: 1) unlikely to occur in the Plan Area, 2) could be avoided during Covered Activities, or 3) could be covered under existing regional plans (LCRA TSC HCP Appendix B). Additionally, attempting to cover species that may never be listed, for which incidental take is unlikely to occur in the foreseeable future (because LCRA TSC likely will be able to avoid incidental take for these species), or for which the Service has not developed recommended measures to guide conservation actions would require significant time and cost for LCRA TSC and the Service, particularly with respect to developing new and potentially untested conservation measures for such additional species. Therefore, the Service has determined that including additional covered species is not a reasonable alternative for further consideration in this EIS.

2.4.4 Reduced Incidental Take Alternative

Under this alternative, the LCRA TSC HCP would implement routing, siting, construction, and operation commitments through extreme minimization and avoidance measures that would result in reduced incidental take from the Covered Activities. However, significantly limiting construction periods and methods would: 1) dramatically increase the costs of installing and maintaining LCRA TSC facilities; 2) risk the safety and reliability of the LCRA TSC network; and 3) restrict LCRA TSC's ability to balance the full suite of human and environmental

constraints when planning for new facilities. Additionally, it is likely that LCRA TSC would still need to engage in the HCP process with the Service for specific projects, resulting in delays and jeopardizing LCRA TSC's ability to provide efficient, safe, and reliable services to its customers. For these reasons, the Service has determined that a reduced incidental take alternative is not a reasonable alternative for further consideration in this EIS.

CHAPTER 3. AFFECTED ENVIRONMENT

3.1 Introduction

The affected environment describes the current environmental conditions for resources within the Plan Area. We dismissed some resources from analysis (Section 3.1.3), thus restricting the discussion of resources to those the Proposed Federal Action would affect.

This EIS uses the LCRA TSC HCP's Plan Area for analysis purposes, except where specifically noted, as the LCRA TSC HCP Plan Area spans the 241 Texas counties within which Covered Species and other affected resources could experience direct, indirect, or cumulative effects from the Proposed Federal Action. Although the HCP Handbook (Service and NMFS 2016) indicates that NEPA analysis areas may differ based on resource or alternatives, the programmatic nature of the LCRA TSC HCP and lack of known projects generally preclude further analysis area refinement for this EIS.

3.1.1 Regional Environmental Setting

The Plan Area includes parts of 12 ecoregions (Griffith et al. 2007). Ecoregions are geographic areas with continuity of natural resource availability, vegetation communities, and other factors (Griffith et al. 2007). The characteristics associated with ecoregions influence the type and distribution of animal and plant species that occur across the Plan Area. The LCRA TSC HCP (Chapter 2.2) summarizes each ecoregion.

Climate in the Plan Area varies from sub-tropical to semi-arid and is affected by seasonal air masses (such as arctic fronts), subtropical west winds from the Pacific Ocean and Mexico, tropical cyclones and hurricanes from the Gulf of Mexico, a high-pressure system from the Atlantic Ocean, and the movement of the jet streams (Texas Water Development Board [TWDB] 2012).

3.1.2 Resources Analyzed

The Service reviewed all human environment¹ resources to determine which resources could be significantly affected by the Proposed Federal Action and should be carried forward in this EIS for further detailed analysis, and which resources could be eliminated from detailed analysis (see Section 3.1.3). In accordance with Council on Environmental Quality (CEQ) NEPA guidance, this EIS is “analytic rather than encyclopedic,” discusses impacts proportionally to their significance, and only briefly discusses impacts that are not significant (40 CFR 1502.2[a] [b]). We describe the resources expected to be significantly affected by the Proposed Federal Action, either adversely or beneficially, in Section 4 of this EIS.

3.1.3 Resources Not Considered for Detailed Analysis

Below we list the resources dismissed from further discussion and analysis in this EIS and briefly explain why. Pursuant to the Service's and NMFS's (2016) revised Habitat Conservation Planning and Incidental Take Permit Processing Handbook (HCP Handbook), “The extent of the [Service's] environmental review under NEPA is dictated by the environmental effects triggered by the federal action – issuance of the ITP and required conservation actions of the HCP.” The

¹ The CEQ defines the human environment as the natural and physical environment, and the relationship of people with that environment (1508.14).

HCP Handbook also notes, “[i]t is critical to the NEPA process that we [the Service and NMFS]... do not unnecessarily analyze impacts that are not a result of our action and over which we do not have regulatory authority...we must consider whether the federal action, in this case the ITP, is the legally relevant cause of the effects which must be analyzed.”

The Service recognizes that Covered Activities could result in varied environmental or social impacts. However, Covered Activities would occur regardless of whether the Service issues the requested ITP and LCRA TSC implements the conservation measures associated with the ITP and HCP. Rather, the Service’s authority is limited to determining whether an ITP application complies with issuance criteria set forth in section 10 of the Act, including the requirement that an applicant minimizes and mitigates the impacts of the proposed taking to the maximum extent practicable. Therefore, the NEPA analysis is limited to only those resources that would be affected by LCRA TSC’s proposed incidental take and Conservation Program.

Energy and Depletable Resource Requirements and Conservation Potential

The Proposed Action does not include an energy or resource extraction component and will not require energy or resources to be depleted; therefore, this topic is dismissed from detailed analysis.

Prime and Unique Farmlands

The *Farmland Protection Policy Act* (FPPA), Subtitle I of Title XV of the *Agricultural and Food Act of 1981*, Pub. L. 97-98, provides protection to prime and unique farmlands. Prime and unique farmlands are defined by the U.S. Department of Agriculture, Natural Resources Conservation Service (NRCS) in the FPPA as “land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops”. The purpose of the FPPA is to minimize the extent to which Federal programs contribute to the unnecessary and irreversible conversion of prime, unique, and other farmlands of statewide or local importance to non-agricultural uses. According to the NRCS soil data, mapped prime farmland in the Plan Area is located in the high plains and east of the Balcones Escarpment; which is typically delineated by the I-35. In analyzing the impacts of the Proposed Action on prime and unique farmlands, consideration is given to the impacts of taking Covered Species habitat as well as conserving habitat. Suitable habitat for the Covered Species includes woodland, shrubland, and Karst Zones. These habitats are not generally used for agricultural production; woodlands and shrubland habitats are sometimes used as rangeland. Part 523.10 of the FPPA Manual stipulates that projects are only subject to FPPA requirements if they may irreversibly convert farmland (directly or indirectly) to nonagricultural use and are completed by a Federal agency or with assistance from a Federal agency. Per NRCS direction (NRCS 2018), activities not subject to FPPA include Federal permitting or licensing actions. Agricultural lands potentially affected by the HCP are not subject to NRCS approval or FPPA regulatory requirements. Moreover, any impacts to prime farmland would occur whether or not the Service issues the requested ITP and whether or not LCRA TSC implements the required Conservation Measures. As such, this issue was not carried forward as a separate section. However, the Vegetation section of this EIS considers potential Plan impacts to all vegetation and land cover types.

Public Health and Safety/Recreation/Hazardous Materials

The Proposed Action will not likely detract from or contribute to public health or safety. While there may be an expectation that preserve lands, purchased by public entities, will have some level of public access, the primary purpose of the preserve system is for the long-term conservation of the Covered Species. Secondary use of preserve lands will not be authorized if the use will have a reasonable likelihood of materially reducing the long-term conservation value of the protected habitat for the Covered Species. As such, it is unlikely that public recreational use of the preserve system for public health purposes will be authorized.

Implementing the Covered Activities are not expected to reduce the number of people accessing any particular park or recreation area. During the routing process for new electric transmission line projects, alternative routes are evaluated based on criteria such as crossing or right-of-way (ROW) within 1,000 feet of any designated park or recreation area. Although large tracts of parkland and numerous recreational sites are located within the proposed Permit Area, the Applicant will attempt to avoid these lands when routing new electric transmission projects, thereby minimizing the amount of such land crossed. These lines may, however, impact the visual aesthetics of a recreational area, which is why we analyze aesthetics in this EIS.

The Applicant would evaluate any new easements or land acquisitions for hazards or hazardous materials through an Environmental Site Assessment and address any issues identified accordingly. Therefore, public health and safety, recreation, and hazardous materials impacts would be consistent across alternatives and would not rise above the insignificant level.

Geology

Neither the authorization of incidental take of Covered Species, nor the implementation of the minimization and mitigation measures of the HCP is expected to affect soils and geology. For any Covered Activity, impacts would be limited in geographic extent, be minimized through best management practices (BMPs) and compliance with TCEQ general construction permits (stormwater/erosion controls), and cease when construction ends and grounds are stabilized. Moreover, any impacts to soils and geology would occur whether or not the Service issues the requested ITP and whether or not LCRA TSC implements the required Conservation Measures. Therefore, potential impacts would be consistent across alternatives and would not rise above the insignificant level for this resource.

Impacts to karst with caves supporting endangered karst invertebrates is analyzed in this EIS (Section 3.4).

Air Quality

Air pollution may contribute to adverse human health impacts and ecosystem degradation. Major sources of air pollution come from point sources, such as stationary industrial, commercial, and construction and mining equipment and non-point sources such as lawn and garden equipment and motor vehicles. The *Clean Air Act of 1970* (CAA), as amended, resulted in requirements to consider the impact that proposed Federal actions may have on air quality. Under the CAA, the EPA sets national ambient air quality standards (NAAQS) for seven air pollutants to protect public health and the environment, with an adequate margin of safety: carbon monoxide (CO), ozone (O₃), nitrogen dioxide (NO₂), sulfur dioxide (SO₂), particulate

matter, 10 and 2.5 microns and less (PM₁₀ and PM_{2.5}) and lead (Pb). EPA delegated authority for monitoring and enforcing air quality regulations in Texas to the TCEQ Office of Air Quality.

The Covered Activities could have an adverse effect on air quality such as from the temporary use of heavy machinery and other construction activities, and the removal of existing vegetation; however, such effects would occur whether or not the Service issues the requested ITP. Moreover, the additive magnitude of any potential effects from machinery or construction activities related to Covered Activities would be negligible, since these types of activities already occur in the Plan Area for agricultural and development activities, and would be temporary in nature. The Proposed Action is not a prerequisite for or a catalyst to land development or agricultural activities; these activities are anticipated to occur whether or not the LCRA TSC HCP is implemented; therefore, there is no causal connection between the Proposed Action and any negligible impact on air quality.

The conservation of habitat for the Covered Species required under the LCRA TSC HCP and ITP could result in beneficial impacts to air quality. Conservation of open space has been shown to improve air quality by protecting the plants that naturally create oxygen and filter out air pollutants such as ozone, sulfur dioxide and carbon monoxide (Sherer 2003; Coder 1996). However, the extent of these benefits is largely tied to location of the open spaces as well as the density and type of vegetation. At this time, neither the location nor the size of habitat preserve lands has been identified for the Proposed Action; therefore, the effects of the Proposed Action on air quality cannot be measured, although they are expected to be negligibly beneficial.

Noise

Implementation of the Covered Activities, including the removal or alteration of vegetation with heavy machinery, could temporarily add to the ambient noise levels. However, the impacts would occur whether or not the Service issues the requested ITP. The magnitude of any of these potential effects is expected to be negligible, and any increase in ambient noise resulting from clearing activities would be temporary in nature. Agricultural practices and land and energy development activities, as well as traffic, would contribute to any ambient noise, are expected to continue regardless of whether or not the ITP is issued and the HCP is implemented; therefore, there is no causal connection between any impacts relating to this resource and the Proposed Action.

Transportation

Texas contains 25 Metropolitan Planning Organizations (MPOs) designed to provide comprehensive transportation planning in their respective regions. The proposed Permit Area contains the following nine MPOs: Abilene, Dallas/Fort Worth, Killeen/Temple, Longview, Midland/Odessa, Sherman/Denison, Tyler, Waco, and Wichita Falls. Each of the MPOs' Metropolitan Transportation Plans, Transportation Improvement Programs, and Unified Planning Work Programs have identified multiple proposed roadway projects located within the proposed Permit Area, including new construction, maintenance, rehabilitation, and enhancement of roadways (Texas Department of Transportation [TXDOT] 2019). The Proposed Action and implementation of the Conservation Program will not induce the construction of new roads or highways; rather, the Covered Activities are undertaken in response to growth that has or is

occurring, and would occur whether or not the Service issues the requested ITP and whether or not LCRA TSC implements the Conservation Program required in the LCRA TSC HCP.

Potential impacts to transportation from new electric transmission projects could include disruption of traffic or conflicts with proposed roadway and utility improvements, and may also include increased traffic during the construction period. However, individual projects would generate only minor construction traffic at any given time or location. This traffic would consist of construction employee's personal vehicles, truck traffic for material deliveries, concrete trucks for structure foundation work, and mobile cranes for structure erection. These impacts are expected to be temporary in nature and short-term.

New electric transmission projects could cross multiple U.S. and state highways, farm-to-market and ranch-to-market roads. The Applicant will obtain road-crossing permits from TXDOT for any State-maintained roads or highways, which include U.S. and state highways, farm-to-market and ranch-to-market roads, crossed by the eventual approved electric transmission line routes. This would ensure that proposed projects minimize any effect on traffic and roadways within the proposed Permit Area. During the routing process for new electric transmission line projects, alternative routes are evaluated based on criteria such as the number of Federal Aviation Administration (FAA)-registered airports, private airstrips and heliports located within a specified distance of a proposed transmission line centerline. FAA notification may be required for routes that meet the distance criteria. The result of this notification, and any subsequent coordination with the FAA, could include changes in the transmission line design and/or potential requirements to mark and/or light the transmission line structures to avoid impacts. Avoidance of aviation facilities and compliance with all FAA regulations would ensure that proposed projects have no effect on aviation operations within the proposed Permit Area.

Because there is no reasonably foreseeable causal connection between any impacts to this resource and the Proposed Action (Service and NMFS 2016), and because the requested ITP and the Conservation Measures set forth in the LCRA TSC HCP would not alter ongoing or future land use, impacts to this resource will not be addressed further in the EIS.

Land Use

Land use impacts from Covered Activities associated with construction of new facilities can be defined by the amount of land displaced by the actual ROW and by the compatibility of the project corridors with adjacent land uses. During the construction of new projects and the maintenance of existing facilities, temporary impacts to land uses within the ROW could occur due to the movement of workers, equipment, and materials through the area. Construction noise and dust, as well as temporary disruption of traffic flow, may also temporarily affect residents and businesses in the area immediately adjacent to the ROW. Coordination among the Applicant, contractors, and landowners regarding access to the ROW and construction scheduling should minimize these disruptions. Changes in land use, such as conversion of agricultural land to residential areas, results in a demand for the Covered Activities, rather than the Covered Activities causing a change in land use.

Generally, the most important measure of potential land use impact is the number of habitable structures (i.e., residences, businesses, schools, churches, hospitals, nursing homes, etc.) located

in the vicinity of the project. The least impact to land use generally results from locating new electric transmission lines either within or parallel to existing ROW. Also, the overall length of a transmission project can be an indicator of the relative level of land use impacts. During the routing process for new transmission line projects, the number of habitable structures affected by potential routes and their proximity to potential routes is determined, existing infrastructure are identified, and the length of various alternatives are measured by evaluating aerial photography and existing maps. This information is verified in the field where possible.

Impacts to agricultural land uses from new transmission projects or maintenance of existing facilities are expected to be minor, since these facilities would not interfere with typical agricultural practices (for example, grazing). In addition, in most cases, the impacts on croplands would also be minor as new electric transmission facilities would be placed along fences and property lines. The landowners' use of their fields would not be inhibited and the only land not made available for agricultural use would be the area occupied by poles or pads and within the ROW temporarily during construction. Most existing agricultural land uses may be resumed within the ROW following construction.

Because there is no reasonably foreseeable causal connection between any impacts to this resource and the Proposed Action (Service and NMFS 2016), and because the requested ITP and the Conservation Measures set forth in the LCRA TSC HCP would not alter ongoing or future land use, impacts to this resource will not be addressed further in the EIS.

3.2 Aesthetics

The Plan Area covers approximately 163 million acres over 241 counties throughout the State of Texas and includes a complex variety of landscape types, e.g., plains, mountains, valleys, agricultural lands, and developed areas, etc.—each type possessing a range of aesthetic values: from visually sensitive areas (generally undeveloped and mostly appearing natural) to visually non-sensitive (developed and mostly appearing non-natural). The geographic scale of the Plan Area does not allow for site-specific aesthetic descriptions. Therefore, this section summarizes the affected aesthetic environment through a broad-scale review of public parks and other publicly accessible protected areas as described in the Protected Area Database – U.S. (PAD-US) (Table 5) (U.S. Geological Survey [USGS] 2016). Federal entities own approximately 3.3 percent of the Plan Area, mostly under the administration of the National Park Service or the Service (USGS 2016). State and local government entities own approximately 1.4 percent of the Plan Area (USGS 2016).

Table 5. Potential Visually Sensitive Areas

Ownership Type	Property Types	Geographic Representation (% of Plan Area)
Federal	—	3.33%
<i>U.S. Fish and Wildlife Service</i>	<i>National Wildlife Refuges</i>	0.89%
<i>National Park Service</i>	<i>National Parks, Wilderness Areas, National Recreation Areas, National Seashores, Wild and Scenic Rivers, National Historic Places and Sites</i>	1.09%
<i>U.S. Army Corps of Engineers</i>	<i>Recreation Reservoirs</i>	0.57%

Ownership Type	Property Types	Geographic Representation (% of Plan Area)
Forest Service	National Forests, Experimental Forests, National Grasslands, Roadless Areas, Wilderness Areas, Recreation Areas	0.49%
Department of Defense Military Lands	Forts and Bases	0.21%
Other Federal Agencies		0.08%
State	Parks, Natural Areas, Wildlife Management Areas, Forests, Historic Sites, Fish Hatcheries, University and School Lands, Trust Lands	1.41%
Regional Agency Special Districts	River Authorities, Water Districts	0.03%
County and City	Parks, Preserves	0.15%
American Indian	Alabama-Coushatta Tribes of Texas, Kickapoo Traditional Tribe of Texas, Kiowa Indian Tribe, Comanche Nation, Apache Tribe of Oklahoma	0.003%

3.3 Aquatic Resources

Aquatic habitats used by Covered Species in the Plan Area consist of perennial rivers and streams, intermittent or ephemeral streams, inland impoundments, other open waters, and wetlands (Table 6; also see LCRA TSC HCP Chapter 2.6). Nine major aquifers and several other minor aquifers and major springs that naturally discharge groundwater also occur in the central and western portions of the state (Bureau of Economic Geology [BEG] 2004).

Table 6. Surface Waters in the Plan Area

Major River or Coastal Basin	Perennial Rivers and Streams (miles)*	Intermittent or Ephemeral Streams (miles)*	Impoundments and Other Non-coastal Open Waters (acres)†	Wetlands (acres)‡
Brazos River Basin	4,564	71,765	745,266	231,152
Canadian River Basin	753	18,280	108,425	81,847
Colorado River Basin	2,009	56,023	456,497	115,413
Cypress River Basin	1,621	3,511	62,212	65,959
Guadalupe River Basin	944	14,285	108,292	121,678
Lavaca River Basin	446	3,477	43,073	20,492
Neches River Basin	5,753	16,977	166,776	336,197
Nueces River Basin	784	32,457	151,906	22,974
Red River Basin	2,601	43,011	410,828	233,156
Rio Grande River Basin	584	88,325	106,935	21,923
Sabine River Basin	2,897	12,980	244,862	215,624
San Antonio River Basin	537	7,814	49,357	16,505
San Jacinto River Basin	1,242	4,437	110,914	144,093
Sulphur River Basin	656	7,281	88,283	163,734
Trinity River Basin	5,504	34,700	906,181	444,241
Brazos-Colorado Coastal Basin	649	1,273	35,150	121,422
Colorado-Lavaca Coastal Basin	264	454	19,577	39,649
Lavaca-Guadalupe Coastal Basin	278	511	27,425	60,837
Neches-Trinity Coastal Basin	522	408	74,101	337,045
Nueces-Rio Grande Coastal Basin	186	3,187	149,534	234,309
San Jacinto-Brazos Coastal Basin	287	511	47,052	91,565
Trinity-San Jacinto Coastal Basin	59	46	5,727	15,158

Source: U.S. Geological Survey (2013) and U.S. Fish and Wildlife Service (2016a)

* National Hydrography Dataset Flowline Feature Class; Stream/River Type; Perennial, Intermittent, or Ephemeral Codes

† National Hydrography Dataset Waterbody Feature Class; Lake/Pond, Playa, or Reservoir Types

‡ National Wetland Inventory, Estuarine and Marine Wetland, Freshwater Emergent Wetland, and Freshwater Forested/Shrub Wetland Types

3.4 Covered Species

LCRA TSC's HCP identifies 23 Covered Species, of which 22 are listed as federally threatened or endangered. Table 7 lists the Covered Species by taxon and the current listing status of each species. The LCRA TSC HCP (Appendix D) provides species descriptions.

Table 7. Covered Species

Common Name	Scientific Name	Federal Listing Status
BIRDS		
Golden-cheeked warbler	<i>Setophaga chrysoparia</i>	Endangered
Whooping crane	<i>Grus americana</i>	Endangered
Piping plover	<i>Charadrius melodus</i>	Threatened
Rufa red knot	<i>Calidris canutus rufa</i>	Threatened
Red-cockaded woodpecker	<i>Picoides borealis</i>	Endangered
MAMMALS		
Ocelot	<i>Leopardus pardalis</i>	Endangered
REPTILES		
Spot-tailed earless lizard*	<i>Holbrookia lacerata</i>	Not listed, petitioned for listing
AMPHIBIANS		
Houston toad	<i>Anaxyrus</i> (formerly <i>Bufo</i>) <i>houstonensis</i>	Endangered
Barton Springs salamander	<i>Eurycea sosorum</i>	Endangered
Georgetown salamander	<i>Eurycea naufragia</i>	Threatened, with 4(d) Special Rule
Jollyville Plateau salamander	<i>Eurycea tonkawae</i>	Threatened
Salado Springs salamander	<i>Eurycea chisholmensis</i>	Threatened
San Marcos salamander	<i>Eurycea nana</i>	Threatened
INVERTEBRATES		
Comal Springs riffle beetle	<i>Heterelmis comalensis</i>	Endangered
Peck's Cave amphipod	<i>Stygobromus pecki</i>	Endangered
Bee Creek Cave harvestman	<i>Texella reddelli</i>	Endangered
Tooth Cave spider	<i>Tayshaneta myopica</i>	Endangered
Tooth Cave ground beetle	<i>Rhadine persephone</i>	Endangered
Madla Cave meshweaver	<i>Cicurina madla</i>	Endangered
Government Canyon Bat Cave spider	<i>Tayshaneta microps</i>	Endangered
Helotes mold beetle	<i>Batrisodes ventyivi</i>	Endangered
Elongate ground beetle with no common name	<i>Rhadine exilis</i>	Endangered
Robust ground beetle with no common name	<i>Rhadine infernalis</i>	Endangered

* The spot-tailed earless lizard has two recognized subspecies, *Holbrookia lacerata* and *Holbrookia lacerata subcaudalis*. Hereafter, all discussion of this species in the EIS encompasses both subspecies.

3.5 Cultural Resources

Because LCRA TSC does not know the exact locations of Covered Activities at this time, this section provides general information concerning cultural resources in the Plan Area. The LCRA TSC HCP (Appendix A) describes a thorough analysis of NHPA compliance requirements once the location and footprints of the Covered Activities are determined. LCRA TSC will consult, as necessary, and will consider and address impacts from Covered Activities on cultural resources. By implementing these steps, LCRA TSC would assist the Service in considering the effects of an undertaking on historic properties pursuant to NHPA Section 106.

3.5.1 Cultural Resources Setting

The following cultural context was summarized from entries in the Handbook of Texas (Texas State Historical Association 2010), Texas Beyond History (University of Texas at Austin 2018), and the *Prehistory of Texas* (Perttula 2004).

Four broad periods comprise the cultural sequence of the state: Paleoindian, Archaic, Late Prehistoric, and Historic. Beginning in the Late Pleistocene (ca. 13,500 years ago), groups occupying present-day Texas spanned a variety of environmental settings, from the immense grassland prairies of the Great Plains to dense hardwood forests of the North American Eastern Woodlands, and all settings in between (Story 1990). While many consider the Clovis complex to be the first well-defined culture, a number of researchers are challenging the Clovis-first paradigm, suggesting settlers arrived earlier. There has yet to be a broad consensus on the matter. The most commonly found projectile points are Lanceolate and occur throughout Texas at archaeological sites of the Paleoindian period (Bousman et al. 2004). These sites are predominantly isolated artifacts and short-term occupations in playas, dunes, and arroyos with some occasional deeply buried sites within alluvial terraces, all generally reflecting a highly mobile lifestyle. The food relied upon in Paleoindian times was large Pleistocene and early Holocene fauna (e.g., bison), supplemented with smaller game and plant resources.

Around 8,800 B.P., changes in lithic, ground stone, and burned rock technology signaled new hunter-gatherer subsistence strategies that would characterize the long Archaic period of Texas. Notched dart points, found especially at large base camps on upland plateaus, ridge tops, and within rockshelters, as well as at smaller satellite camps along drainages, distinguishes this period. Climate ranged from the Holocene thermal maximum to conditions that approximate current times. Prehistoric groups of increasing size and social complexity exploited a wider variety of plants and animals, as indicated by the diverse food procurement/processing implements of the Archaic period (Perttula 2004; Story 1990). Smaller side- and corner-notched projectile points are typical of bow-and-arrow technology of the subsequent Late Prehistoric period.

Beginning around 1200 B.P., the Late Prehistoric period coincides with the emergence of new technologies such as pottery and the bow and arrow, as well as an increased reliance on tropical cultigens among some groups. Lowland areas, within some rockshelters, and on top of high ridges in western and northwestern Texas support archaeological sites of this period. In northern Texas, the Late Prehistoric Plains Village period developed from a fusion of distinctive economic patterns, including sedentary agriculture and long-range hunting, often of large game such as deer and bison. Researchers have also suggested the period marked dramatic population growth, intensive agriculture, permanent settlements (reflected by houses and cemeteries), and the emergence of regionally distinct, socially complex cultural groups (e.g., the archaeologically identified Antelope Creek and Henrietta complex groups). The groups of the Plains Village period frequently occupied fertile floodplains or prominent ridges overlooking floodplains with habitations commonly found near the confluence of drainages.

The Historic period begins with European explorers entering Texas (A.D. 1527) and the introduction of the horse and other trade goods (guns, kettles, and iron tools) to native Caddo, Comanche, Apache, Kiowa, Wichita, and other groups. Texas remained under Spanish rule and

settlement for the first three centuries of history. By the 1700s, Europeans and Anglo-Americans encroached upon Texas, steadily increasing in numbers following the 1803 Louisiana Purchase. Anglo-American settlers continued to settle the state after Mexico gained its independence from Spain in 1821. Texas went on to become a republic and later a state in 1845. Throughout the nineteenth century, ranching and agriculture were economic pillars before the Spindletop gusher marked the advent of the oil and gas era at the outset of the twentieth century.

3.5.1.1 NATIONAL REGISTER OF HISTORIC PLACES

There are 3,205 NRHP-listed properties in the Plan Area. These properties include buildings, such as historic houses; districts, such as the Fort Worth stockyards and historic parks; objects, such as monuments (e.g., San Jacinto) and statues; sites, such as archaeological sites and cemeteries; and structures, including historic bridges and dams. Located throughout the state, historic properties have the highest concentrations within counties with major urban areas, including Harris, Bexar, Travis, Victoria, Tarrant, and Dallas. These six counties contain approximately 30.8 percent of NRHP properties in the Plan Area.

3.5.1.2 NATIONAL HISTORIC LANDMARKS AND TRAILS

The National Park Service lists 47 National Historic Landmarks (NHLs), one National Historic Trail (NHT), two historic trails under consideration for listing as NHTs, and the federally recognized Historic Route 66 within the Plan Area. The National Park Service has administrative responsibilities for the historic routes under the National Trails System Act of 1968 and for the Route 66 Preservation Program enacted in 1999. NHLs receive further considerations under NHPA Section 106 regulations, requiring the lead Federal agency “to the maximum extent possible, undertake such planning and actions as may be necessary to minimize harm to any NHL that may be directly and adversely affected by an undertaking” (*Special Requirements for Protecting National Historic Landmarks*, 36 CFR 800.10[a]).

Distributed across 29 counties throughout the state, the NHLs consist of Spanish colonial sites, historic ranches, the state capitol, homes of significant historical figures, archaeological sites, frontier forts, battlefields, retired military ships, historic districts, and the sites of important events, such as the Kennedy assassination. Counties with major urban centers tend to have NHL clusters.

The three trails listed or under consideration as NHTs are the Camino Real, Butterfield Overland, and Chisholm and Great Western Trails. In 2004, the National Park Service designated the Camino Real de los Tejas as an NHT with a period of historical significance from 1680 to 1845. It comprises a network of historical routes and trails first established by a series of Spanish expeditions, including ones by Alonso de Leon in 1689–1690; Domingo Teran de los Rios, the first governor of the province of Texas, in 1691; and a 1716 trek led by Domingo Ramon to solidify permanent Spanish settlements to confront French expansion. These settlements led to the province that became Texas through the establishment of missions and presidios in the region.

Currently under consideration as an NHT, the Butterfield Overland Mail route was a stagecoach from the Mississippi River to the west coast, terminating in San Francisco. Operating from 1857 to 1861 before the Civil War ended service, the route crossed into Texas at Colbert’s Ferry on

the Red River, passed through a line of forts in north central and western Texas, and through the Guadalupe Mountains to El Paso.

Under consideration for NHT status is the Chisholm and Western Trails, primarily active from 1867 to the mid-1880s. They were among the best-known and well-trodden of the trails developed to move cattle from Texas to the Midwest and Plains, and then onto railheads for transport to the east. Despite the relatively brief period of significance, the two trails are “emblematic of a broadly-defined period, one in which the trailing of Texas cattle signaled the emergence of the Texas economy from its post-Civil War doldrums, and the cattle drives coincided with the depopulation of the bison and the rapidly-moving tide of westbound agricultural settlement” (National Park Service 2014).

U.S. Route 66, dubbed Route 66 and Main Street of America, was one of the earliest Federal roadways in the U.S. Highway System, extending approximately 2,500 miles from Chicago, Illinois, to Los Angeles, California. Within Texas, the route crosses the Texas Panhandle near Texola, continuing westward through McLean, Shamrock, and Amarillo. The American Association of State Highway Officials formally established the route on November 11, 1926. Later that year the various state highway commissions adopted the Federal designation of U.S. Route 66. The NRHP listed portions of Route 66 in Texas: a segment in Conway; the Route 66-Sixth Street Historic District in Amarillo; and a bridge over the Chicago, Rock Island, and Gulf railroads.

3.5.1.3 ARCHAEOLOGICAL SITES

Age determines the basic level of classification for historic and prehistoric archaeological sites. Historic archaeological sites (i.e., historic glass, pottery, and metal scatters, foundations) include artifact scatters, cemeteries, structural remains, markers, and unspecified types. Prehistoric archaeological sites, typically comprising stone tool debris and burned rock, include artifact scatters, open camps, rockshelters, village sites, quarries or other lithic procurement sites, butchering sites, unspecified types, and isolated finds. Regardless of overall counts, sites such as larger settlements, rockshelters, and campsites frequently tend to prove significant to archaeological research than do general artifact scatters. The THC’s site Atlas and TARL site files are the primary repository for information on archaeological sites. The database currently shows over 45,000 sites within the Plan Area as of August 2017.

3.6 Federally Listed Plant Species

This section evaluates 16 federally listed plant species that are not included as Covered Species (Table 8). We evaluated federally listed species for inclusion or exclusion in this EIS, and provide the rationale in Appendix A.

Table 8. Evaluated Federally Listed Plant Species

Common Name	Scientific Name	Species Information	Federal Listing Status
Black lace cactus	<i>Echinocereus reichenbachii</i> var <i>albertii</i>	NatureServe (2018): Found in sandy soils in grasslands, thorn shrublands, and mesquite-acacia woodlands. Endemic to South Texas coastal bend area. Only in Texas in Jim Wells, Kleberg, Nueces, and Refugio Counties. Reported population sizes have exceeded 1,000 during most surveys.	Endangered
Large-fruited sand-verbena	<i>Abronia macrocarpa</i>	NatureServe (2018): Found in deep, well-drained sands, within a post oak (<i>Quercus stellata</i>)-grassland in Freestone, Leon, and Robertson Counties, Texas. Abundance estimated at several thousand individual plants.	Endangered
Navasota ladies' tresses	<i>Spiranthes parksii</i>	NatureServe (2018): Found along the Navasota River and intermittent tributaries of rivers, in openings in post oak woodlands in sandy loam soil in Eastern Texas along the Navasota River, in Bastrop, Brazos, Burleson, Fayette, Freestone, Grimes, Jasper, Leon, Limestone, Madison, Milam, Robertson, and Washington Counties. Approximately 2,000 individuals known to occur.	Endangered; petitioned for delisting
Neches River rose-mallow	<i>Hibiscus dasycalyx</i>	NatureServe (2018): Found along margins of riparian woodlands in seasonally wet soils and in openings of shrub swamps, often near standing water only in east Texas in Cherokee, Harrison, Houston, and Trinity Counties. Most recent estimates account for 2,200 plants, with an additional 210 plants at introduced sites.	Threatened
Slender rushpea	<i>Hoffmannseggia tenella</i>	NatureServe (2018): Occurs in sparsely vegetated openings within grasslands with clay soils; occasionally found on creek banks only in Nueces County, Texas. There are over 10,000 individuals.	Endangered
South Texas ambrosia	<i>Ambrosia cheiranthifolia</i>	NatureServe (2018): Found in grasslands and mesquite-dominated shrublands in coastal south Texas, south to Tamaulipas, Mexico. Found in Cameron, Kleberg, and Nueces Counties, Texas. Difficult to count due to rarity, but several thousand stems identified across at least six extant sites.	Endangered
Star cactus	<i>Astrophytum asterias</i>	NatureServe (2018): Grows in sparse openings between shrub thickets in mesquite grasslands or thorny shrublands in Starr County in south Texas, and Tamaulipas, Mexico. Approximately 5,124 individuals across 25 properties in Texas.	Endangered
Texas ayenia	<i>Ayenia limitaris</i>	NatureServe (2018): Found on terraces and floodplains in subtropical, riparian woodlands with dense vegetation and a canopy cover of approximately 95 percent in Cameron County, Texas, and Coahuila and Tamaulipas, Mexico.	Endangered
Texas golden gladeceess	<i>Leavenworthia texana</i>	NatureServe (2018): Found in vernal wet glades with shallow, calcareous soils on the Weches Formation. Endemic to San Augustine and Sabine Counties in eastern Texas.	Endangered
Texas poppy-mallow	<i>Callirhoe scabriuscula</i>	NatureServe (2018): Occurs in grasslands, shin oak (<i>Quercus havardii</i>) shrublands, and open oak or mesquite woodlands in deep, loose sand in Coke, Mitchell, and Runnels Counties, Texas. There are 10 known populations; individual number unknown.	Endangered

Common Name	Scientific Name	Species Information	Federal Listing Status
Texas prairie dawn	<i>Hymenoxys texana</i>	NatureServe (2018): Found in poorly drained, sparsely vegetated or barren areas and in grasslands at the bases of small mounds in Harris County, Texas. Known populations contain more than an estimated 50,000 individuals.	Endangered
Texas snowbells	<i>Styrax texanus</i> (Syn. <i>Styrax platanifolius</i> spp. <i>texanus</i>)	NatureServe (2018): Grows in the crevices along steep limestone cliffs along streams and in gravel of dry creek beds in Edwards, Real, and Val Verde Counties with reporting in Kinney County, Texas, as well. There are 22 known natural populations with an estimated number of individuals totaling less than 1,000.	Endangered
Texas trailing phlox	<i>Phlox nivalis</i> spp. <i>texensis</i>	NatureServe (2018): Found in fire-maintained openings in deep, sandy soil in upland longleaf pine (<i>Pinus palustris</i>) savannahs and post oak-bluejack oak (<i>Quercus stellata</i> - <i>Q. incana</i>) woodlands in Hardin, Polk, and Tyler Counties in Texas. Abundance estimates are less than 750 individuals.	Endangered
Tobusch fishhook cactus	<i>Sclerocactus brevihamatus</i> spp. <i>tobuschii</i>	NatureServe (2018): Occupies shallow, gravelly soil amongst areas of exposed limestone on the escarpment of the Edwards Plateau in the Central Texas Hill Country. Documented on 10 protected reserves where the largest population has reached 1,100 individuals.	Endangered; proposed for downlisting
Walker's manioc	<i>Manihot walkerae</i>	NatureServe (2018): Occurs in grassland-thornscrub in sandy-loam soils underlain by caliche in Hidalgo County, Texas, and adjacent areas of Mexico. There are probably less than 1,000 individuals.	Endangered
White bladderpod	<i>Physaria pallida</i>	NatureServe (2018): Found in open areas associated with exposed calcareous outcrops, which are perpetually wet in San Augustine County, Texas. Abundance estimates are approximately 3,500 individual plants.	Endangered

3.7 Other Non-Federally Listed Wildlife Species

The analysis did not identify any federally listed wildlife species that are not already included as Covered Species. We evaluated federally listed species for inclusion or exclusion in this EIS and provide the rationale in Appendix A.

3.7.1 General Wildlife

We summarize general wildlife associated with the 12 ecoregions that occur within the Plan Area in Table 9, as described by Wilken et al. (2011). LCRA TSC HCP Chapter 2.2 provides a detailed description of each ecoregion.

Table 9. Ecoregions within the Plan Area with Associated Wildlife.

Ecoregion	Common Species
Chihuahuan Desert	Wildlife species found in this ecoregion include desert bighorn sheep (<i>Ovis canadensis nelson</i>), mule deer (<i>Odocoileus hemionus</i>), pronghorn (<i>Antilocapra americana</i>), coyote (<i>Canis latrans</i>), bobcat (<i>Lynx rufus</i>), kit fox (<i>Vulpes macrotis</i>), collared peccary (<i>Pecari tajacu</i>), jackrabbit (<i>Lepus sp.</i>), Montezuma quail (<i>Cyrtonyx montezumae</i>), black-throated sparrow (<i>Amphispiza bilineata</i>), and Texas horned lizard (<i>Phrynosoma cornutum</i>).

Ecoregion	Common Species
Edwards Plateau	Wildlife species found in this ecoregion include white-tailed deer (<i>Odocoileus virginianus</i>), collared peccary, bobcat, coyote, American badger (<i>Taxidea taxus</i>), ringtail (<i>Bassariscus astutus</i>), North American porcupine (<i>Erethizon dorsatum</i>), nine-banded armadillo (<i>Dasypus novemcinctus</i>), American mink (<i>Vison vison</i>), Llano pocket gopher (<i>Geomys texensis</i>), Mexican free-tailed bat (<i>Tadarida brasiliensis</i>), Rio Grande wild turkey (<i>Meleagris gallopavo intermedia</i>), scaled quail (<i>Callipepla squamata</i>), mourning dove (<i>Zenaida macroura</i>), Texas map turtle (<i>Graptemys versa</i>), Rio Grande perch (<i>Herichthys cyanoguttatus</i>), Guadalupe bass (<i>Micropterus treculii</i>), widemouth blindcat (<i>Satan eurystomus</i>), and Comal blind salamander (<i>Eurycea tridentifera</i>).
High Plains	Wildlife found within this ecoregion include pronghorn, coyote, swift fox (<i>Vulpes velox</i>), jackrabbit, cottontails (<i>Sylvilagus sp.</i>), ferruginous hawk (<i>Buteo regalis</i>), and lesser prairie chicken (<i>Tympanuchus pallidicinctus</i>).
Southwestern Tablelands	Wildlife currently found in this ecoregion includes mule deer, pronghorn, coyote, ringtail, black-tailed prairie dog (<i>Cynomys ludovicianus</i>), desert cottontail (<i>Sylvilagus audubonii</i>), kangaroo rat (<i>Dipodomys sp.</i>), Plains pocket mouse (<i>Perognathus flavescens</i>), scaled quail, Swainson's hawk (<i>Buteo swainsoni</i>), burrowing owl (<i>Athene cunicularia</i>), lark sparrow (<i>Chondestes grammacus</i>), rattlesnake (<i>Crotalus sp.</i>), and prairie skink (<i>Plestiodon septentrionalis</i>).
Western Gulf Coastal Plains	Wildlife associated with this ecoregion include white-tailed deer, ocelot (<i>Leopardus pardalis</i>), jaguarundi (<i>Puma yagouaroundi</i>), coyote, ringtail, nine-banded armadillo, collared peccary, swamp rabbit (<i>Sylvilagus aquaticus</i>), American alligator (<i>Alligator mississippiensis</i>), ferruginous pygmy-owl (<i>Glaucidium brasilianum</i>), green jay (<i>Cyanocorax yncas</i>), Altamira oriole (<i>Icterus gularis</i>), Attwater's greater prairie-chicken (<i>Tympanuchus cupido attwateri</i>), whooping crane (<i>Grus americana</i>), and a variety of ducks and geese.
Cross Timbers	Wildlife typically found in this ecoregion includes white-tailed deer, bobcat, common gray fox (<i>Urocyon cinereoargenteus</i>), northern raccoon (<i>Procyon lotor</i>), cottontails, black-tailed jackrabbit (<i>Lepus californicus</i>), lesser prairie-chicken, Rio Grande wild turkey, mourning dove, eastern meadowlark (<i>Sturnella magna</i>), lark sparrow, box turtle (<i>Terrapene sp.</i>), and rattlesnake.
East Central Texas Plains	Species include white-tailed deer, collared peccary, coyote, ringtail, northern raccoon, Virginia opossum (<i>Didelphis virginiana</i>), bobcat, nine-banded armadillo, black-tailed jackrabbit, eastern cottontail (<i>Sylvilagus floridanus</i>), Cooper's hawk (<i>Accipiter cooperii</i>), northern mockingbird (<i>Mimus polyglottos</i>), scaled quail, white-winged dove (<i>Zenaida asiatica</i>), mourning dove, Texas horned lizard, and Houston toad (<i>Anaxyrus houstonensis</i>).
South Central Plains	Wildlife typical of this area includes white-tailed deer, coyote, American beaver (<i>Castor canadensis</i>), northern raccoon, common muskrat (<i>Ondatra zibethicus</i>), American mink, northern river otter (<i>Lontra canadensis</i>), swamp rabbit, cottontails, nine-banded armadillo, mourning dove, red-cockaded woodpecker (<i>Leuconotopicus borealis</i>), white ibis (<i>Eudocimus albus</i>), Mississippi kite (<i>Ictinia mississippiensis</i>), American alligator, and Louisiana pine snake (<i>Pituophis ruthveni</i>).
Southern Texas Plains	Species include white-tailed deer, collared peccary, coyote, ringtail, ocelot, nine-banded armadillo, Texas pocket gopher (<i>Geomys personatus</i>), Mexican ground squirrel (<i>Ictidomys mexicanus</i>), plain chachalaca (<i>Ortalis vetula</i>), green kingfisher (<i>Chloroceryle americana</i>), greater roadrunner (<i>Geococcyx californianus</i>), Mississippi kite, northern bobwhite (<i>Colinus virginianus</i>), white-winged dove, green jay, mourning dove, mesquite lizard (<i>Sceloporus grammicus</i>), and Laredo striped whiptail (<i>Cnemidophorus laredoensis</i>).
Central Great Plains	American bison (<i>Bos bison</i>), wolves (<i>Canis lupus</i>), black-tailed prairie dogs, and black-footed ferrets (<i>Mustela nigripes</i>) were once common, however current wildlife found in this region includes white-tailed deer, mule deer, pronghorn, coyote, jackrabbit, cottontail, plains pocket mouse, sandhill crane (<i>Antigone canadensis</i>), burrowing owl, prairie falcon (<i>Falco mexicanus</i>), lark sparrow, and the Great Plains toad (<i>Anaxyrus cognatus</i>).
Texas Blackland Prairie	Current species found in the region include coyote, ringtail, nine-banded armadillo, northern raccoon, skunks (<i>Mephitidae</i> spp.), eastern cottontail, plains pocket gopher (<i>Geomys bursarius</i>), turkey vulture (<i>Cathartes aura</i>), lark sparrow, northern cardinal (<i>Cardinalis cardinalis</i>), mourning dove, Texas toad (<i>Anaxyrus speciosus</i>), and Texas horned lizard.
Arizona/ New Mexico Mountains	Typical wildlife for this region includes mule deer, bighorn sheep, mountain lion (<i>Puma concolor</i>), Mexican gray wolf (<i>C. lupus baileyi</i>), coyote, bobcat, ringtail, kit fox, black-tailed jackrabbit, Cooper's hawk, red-tailed hawk (<i>Buteo jamaicensis</i>), turkey vulture, and canyon wren (<i>Catherpes mexicanus</i>).

3.7.2 Migratory Birds

The Migratory Bird Treaty Act of 1918 (MBTA) (16 USC 703-712) prohibits the taking, killing, possession, transportation, and importation of migratory birds, their eggs, parts, and nests, except

when specifically authorized by the U.S. Department of the Interior. Migratory birds include neotropical (long-distance) and temperate (short-distance) migrants, as well as resident species. The wildlife habitats in the Plan Area provide suitable breeding, nesting, feeding, foraging, resting, and/or roosting habitat for a number of migratory bird species groups. These groups include wading birds (e.g., egrets and herons), shorebirds (e.g., sandpipers and plovers), seabirds (e.g., gulls and terns), marsh birds (e.g., rails and coots), waterfowl (e.g., ducks and geese), and land birds, which include raptors (e.g., eagles, hawks, falcons, and owls), and numerous passerines (e.g., sparrows, warblers, flycatchers, jays, and wrens).

3.7.3 Bald and Golden Eagles

The Service is the Federal agency with primary statutory authority for managing bald eagles (*Haliaeetus leucocephalus*) and golden eagles (*Aquila chrysaetos*) under the Bald and Golden Eagle Protection Act (BGEPA) (16 USC 668–668d). In addition to similar protections afforded under the MBTA, the BGEPA also protects eagles from disturbance and human-induced alterations that may impact nesting areas. The bald eagle and the golden eagle are species that may occur in Texas year-round as part of breeding, wintering, and/or migratory populations. Breeding bald eagles in Texas nest from October to July (Texas Parks and Wildlife Department [TPWD] 2018a). Nonbreeding and wintering bald eagles may be present in Texas from early October through mid-March (Lockwood and Freeman 2014). Ortego et al. (2009) documents bald eagle nests from 76 Texas counties between 1970 and 2009, including nests in Dallam and Donley counties in the Texas Panhandle. Nonbreeding or wintering populations concentrate near large reservoirs in the Texas Panhandle, Central Texas, and East Texas, but also occur in other areas of suitable habitat throughout the state (TPWD 2018a; Lockwood and Freeman 2014).

Bald eagle habitat (including nesting, wintering, and migration stop-over habitat) is typically associated with large bodies of water, which are important foraging areas for this largely fish-eating bird. However, bald eagles also readily feed on other animals and carrion, when available (Ortego et al. 2009). Bald eagle nests tend to be located in tall trees within forested areas that are within 2 kilometers of large waterbodies, but Ortego et al. (2009) reports a bald eagle pair observed nesting in the Texas Panhandle far from a large water body or forest cover. Importantly, bald eagles also occasionally nest on human-made structures such as electric transmission towers and artificial nest platforms (Ortego et al. 2009).

Golden eagles are rare to locally uncommon residents (breeding and wintering) in the Texas Panhandle and the western and central Trans-Pecos region, but migrants are also occasionally (but rarely) observed in other parts of the state (Lockwood and Freeman 2014). Outside of the Texas Panhandle and Trans-Pecos region, isolated breeding records occur as far east as central Val Verde County (Lockwood and Freeman 2014). Resident golden eagles in Texas defend their territories year-round and breed from early February to November (Tweit 2007), while winter visitors may be present in Texas from early October to mid-March (Tweit 2007).

Golden eagles in the western United States (including the Texas population) use a wide variety of open or semi-open habitats associated with mountains, foothills, plains, savanna, and other forms of open country (Kochert et al. 2002). This species feeds primarily on small mammals, but will also take birds, reptiles, and carrion (Kochert et al. 2002). Nest sites are frequently on a cliff

edge or, less commonly, in a large tree or even on the ground. Nesting pairs have been observed using and maintaining as many as 14 alternate nests within their territories (Kochert et al. 2002).

3.7.4 State-Listed Species

In Table 10 we list the 21 state-listed species that were determined as likely to be exposed to, and potentially impacted by, Covered Activities. Appendix A describes the rationale.

Table 10. State-Listed Species

Common Name	Scientific Name	Species Information	Listing Status*
BIRDS			
Zone-tailed hawk	<i>Buteo albonotatus</i>	NatureServe (2018) and Cornell Lab of Ornithology (2018a): Medium-large raptor with broad wings; slaty black with light banks on tail and wings; yellow legs and face skin. Prefer open deciduous or pineoak woodlands of open arid country.	Federal NL; State Threatened; NatureServe Global Rank G4 / State Rank S3B
White-tailed hawk	<i>Geranoaetus</i> (syn. <i>Buteo</i>) <i>albicaudatus</i>	NatureServe (2018): Rarely found in open forest, more common in open country, savanna, prairie, and arid habitats with cacti, mesquite, and bushes.	Federal NL; State Threatened; NatureServe Global Rank G4G5 / State Rank S4B
Black-capped vireo	<i>Vireo atricapilla</i>	NatureServe (2018): Small songbird with conspicuous white “spectacles.” Found in dense low thickets and oak scrub, mostly on rocky hillsides or steep ravine slopes in rugged terrain	Federal NL; State Endangered; NatureServe Global Rank G3 / State Rank S2B
Cactus ferruginous pygmy-owl	<i>Glaucidium brasilianum cactorum</i>	NatureServe (2018): Small, long tailed, yellow-eyed owl with gray-brown upper underparts, reddish tail with dark bars; two white/black spots on nape resemble eyes. Largest population in Texas found in live oak (<i>Quercus fusiformis</i>) and mesquite (<i>Prosopis glandulosa</i>) forested coastal sand plains	Federal NL; State Threatened; NatureServe Global Rank G5T3 / State Rank S3B
Bachman’s sparrow	<i>Peucaea aestivalis</i>	NatureServe (2018): Large sparrow with large bill and long, dark, rounded tail, gray upperparts streaked brown, whitish belly. Found in mature to old growth pine woodland; requires limited shrub and hardwood midstory with well-developed herb and grass layer, breed where fires create suitable conditions.	Federal NL; State Threatened; NatureServe Global Rank G3 / State Rank S3B
Texas Botteri's sparrow	<i>Peucaea botterii texana</i>	NatureServe (2018) and Cornell Lab of Ornithology (2018b): Medium perching bird, flat headed sparrow with long tail and bill, dark crown, unstreaked belly. Found in short-grass plains and grasslands with scattered shrubs, bushes, yucca (<i>Yucca sp.</i>), sagebrush (<i>Artemisia tridentata</i>), or mesquite (<i>Prosopis glandulosa</i>).	Federal NL; State Threatened; NatureServe Global Rank G4T4 / State Rank S3B
Tropical parula	<i>Setophaga pititayumi</i>	NatureServe (2018): Medium perching bird, blue-gray in color with whitish wing bands and yellow underparts. Found in low deciduous woodlands to high rain forests, mostly restricted to subtropical altitudes or latitudes, and absent from sea-level in the Tropical zone.	Federal NL; State Threatened; NatureServe Global Rank G5 / State Rank S3B
Bald eagle	<i>Haliaeetus leucocephalus</i>	TPWD (2018a): Large bird of prey with white head, neck, and tail and a large yellow bill. Breeding territory is primarily on the edge of rivers, lakes, or reservoirs with large, tall (40- to 120-foot) trees. Needs open water or wetlands within 1 mile of nests for feeding. Over-wintering bald eagles (<i>Haliaeetus leucocephalus</i>) also found near open water and areas with high concentrations of prey.	Federal NL; State Threatened; NatureServe Global Rank G5 / State Rank S3B, S4N

Common Name	Scientific Name	Species Information	Listing Status*
White-faced ibis	<i>Plegadis chihi</i>	(TPWD 2018b): Dark, chestnut colored-bird with green or purple on its head and upper parts, and a long, down-curved bill. Found in mostly freshwater habitats of river, marshes, swamps, and ponds.	Federal NL; State Threatened; NatureServe Global Rank G5 / State Rank S4B
MAMMALS			
Rafinesque's big-eared bat	<i>Corynorhinus rafinesquii</i>	NatureServe (2018): Small bat with large ears, gray-brown with distinct fur black at the base and white tips. Often found in abandoned manmade structures, culverts, or cavity trees of bottomland hardwoods.	Federal NL; State Threatened; NatureServe Global Rank G3G4 / State Rank S3
Southern yellow bat	<i>Lasiurus ega</i>	TPWD (2018c): medium-sized bat with dull, sooty yellow fur. Found in a wide range from forest and open habitats, including dry and moist areas.	Federal NL; State Threatened; NatureServe Global Rank G5 / State Rank S1
REPTILES			
Black-striped snake	<i>Coniophanes imperialis</i>	NatureServe (2018): Small black and light striped snake from head to tail. Found in edges of marshy or wet areas, forests, savannas, and agricultural landscapes	Federal NL; State Threatened; NatureServe Global Rank G4G5 / State Rank S2
Chihuahuan Desert lyre snake	<i>Trimorphodon vilkinsonii</i>	NatureServe (2018) and Wildlife North America (2018): Brown-tan-gray mildly venomous snake with dark brown blotching, large eyes, and V pattern on head. Found in mountains, hills, rock outcrops, canyons, fissured bluffs, and arroyos with dry, rocky terrain. In areas of desert plants or riparian vegetation, found on desert flats with creosotebush (<i>Larrea tridentate</i>) or canyons with mesquite (<i>Prosopis glandulosa</i>).	Federal NL; State Threatened; NatureServe Global Rank G4 / State Rank S3
Timber rattlesnake	<i>Crotalus horridus</i>	NatureServe (2018): Medium-large venomous snake with horny rattle on end of tail, yellow-black-gray-reddish with dark cross bands. Prefers hardwood forests, swampy areas, floodplains, river bottoms, hydric hammocks, or cane fields in the south.	Federal NL; State Threatened; NatureServe Global Rank G4 / State Rank S4
Reticulate collared lizard	<i>Crotaphytus reticulatus</i>	NatureServe (2018): Small large-headed long-tailed lizard, granular dorsal scales and pattern of black spots and light net-like pattern. Occur in thorny shrubland/chaparral; often found on rocks, but also on mesquite (<i>Prosopis glandulosa</i>) flats; burrows in soil and hides in fallen logs.	Federal NL; State Threatened; NatureServe Global Rank G3 / State Rank S2
Texas indigo snake	<i>Drymarchon melanurus erebennus</i>	NatureServe (2018) and TPWD (2018d): Large non-venomous snake with blue-black on rear half, dark brown on front half. Found in dense riparian corridors of thornbush-chaparral woodlands. Also found in irrigated and suburban croplands. Requires moist microhabitats, such as rodent burrows.	Federal NL; State Threatened; NatureServe Global Rank G5T5 / State Rank S3
Texas scarlet snake	<i>Cemophora coccinea lineri</i>	NatureServe (2018): Red, black, yellow coloration patterned snake. Found in mixed hardwood scrub on sandy soils.	Federal NL; State Threatened; NatureServe Global Rank G5T2 / State Rank S1S2
Texas tortoise	<i>Gopherus berlandieri</i>	TPWD (2018e): Tortoise with high horned yellow-orange-brown shell, scaly legs, clawed feet. Found in sandy well-drained soils of open scrub woods, lomas, arid brush, grass-cactus associations. Found in shallow depressions at the base of cactus or bush or burrowed underground when inactive.	Federal NL; State Threatened; NatureServe Global Rank G4 / State Rank S2

Common Name	Scientific Name	Species Information	Listing Status*
Texas horned lizard	<i>Phrynosoma cornutum</i>	NatureServe (2018) and TPWD (2018f): Wide-bodied brown-yellow-tan-red-gray spiny lizard. Found in prairies, bajadas, dunes, foothills, playa edges, and deserts with open arid and semiarid regions with sparse vegetation of grass, cactus, scrubby trees, or brush. Hides under rocks or in rodent burrows when inactive. Burrows into soil, usually sandy to rocky.	Federal NL; State Threatened; NatureServe Global Rank G4G5 / State Rank S4
AMPHIBIANS			
Sheep frog	<i>Hypopachus variolosus</i>	NatureServe (2018) and University of California Berkley Amphibia Web (2018a): Brown frog with black-brown-white patterned underparts. Found near water in thorn scrub, open woodland, savanna, and pasture.	Federal NL; State Threatened; NatureServe Global Rank G5 / State Rank S2
White-lipped frog	<i>Leptodactylus fragilis</i>	NatureServe (2018) and University of California Berkley Amphibia Web (2018b): Gray-tan bodied frog with brown-white-black spotting and white line tracing the mouth. Found in various mesic habitats such as fields, ditches, oxbow lakes, and grasslands.	Federal NL; State Threatened; NatureServe Global Rank G5 / State Rank S1

* Federal Status: LE – Listed Endangered, LT – Listed Threatened, NL – Not Listed

State Rank: S1 – Critically Imperiled, S2 – Imperiled, S3 – Vulnerable, S4 – Apparently Secure, S#B – Breeding

Global Rank: G3 – Vulnerable, G4 – Apparently Secure, G5 – Secure, G#G3 – Range Rank, T# – Intraspecific Taxon

3.8 Socioeconomics and Environmental Justice

The Plan Area encompasses approximately 162.8 million acres spanning 241 of Texas's 254 counties (see Figure 1). From 2010 to 2016, Plan Area counties experienced an average 2 percent increase in population, ranging from -21 percent (Terrell County) to 34 percent (Kenedy County). Long-term population estimates suggest greater (29 percent) than average future growth in the Plan Area counties, with the greatest growth over the same time period occurring in counties such as Hays County (136 percent growth), Collin County (102 percent growth), Fort Bend County (100 percent growth), Montgomery County (98 percent growth), and Denton County (98 percent growth) (U.S. Census Bureau 2010, 2016; Texas Demographic Center [TDC] 2017).

Demographic information available through the U.S. Census Bureau (2016) indicates that 24 percent of counties within the Plan Area exceed state averages for the percentage of minority residents that make up the total population. In all counties, Hispanic or Latino residents comprise the largest proportion of minority residents. Fifty-one percent of counties within the Plan Area also have a higher percentage of low-income residents than the state average.

3.9 Vegetation

The Plan Area includes 42 primary ecological systems with over 398 unique groups of vegetation types (TPWD 2018g). Many of these unique vegetation types cover less than 1 percent of the Plan Area. Table 11 identifies the 24 major vegetation types that cover 1 percent or greater within the Plan Area (approximately 62.2 percent; 102,712,919 acres) that could support potential habitat for Covered Species.

Table 11. Covered Species Groups Supported by Major Vegetation Types within the Plan Area

Ecological System: Vegetation Type	Acreage (%) within Plan Area	Description (TPWD 2018g)
Row Crops	18,462,759 (11.18%)	Includes all cropland where fields are fallow for some portion of the year.
Native Invasive: Mesquite Shrubland	10,455,868 (6.33%)	Mesquite (<i>Prosopis glandulosa</i>) is most often the dominant species of this broadly defined system, which occurs throughout most of the state, except in east and south Texas, and mapping of this type is typically on former prairie or savanna soils. Co-dominants vary by region, but include lotebush (<i>Ziziphus obtusifolia</i>), juniper (<i>Juniperus</i> sp.), sugar (<i>Celtis laevigata</i>) or netleaf hackberry (<i>Celtis reticulata</i>), pricklypear (<i>Opuntia</i> sp.), and agarito (<i>Mahonia trifoliolata</i>).
Rolling Plains: Mixedgrass Prairie	7,219,721 (4.37%)	This type circumscribes a variety of grasslands across a relatively large area and under various past and current management regimes; mesquite is often an important woody component.
Post Oak Savanna: Savanna Grassland	5,700,028 (3.45%)	Varieties of grasslands circumscribe this type, and disturbance or tame grasses such as Bermudagrass (<i>Cynodon dactylon</i>), King Ranch bluestem (<i>Bothriochloa ischaemum</i>), kleingrass (<i>Panicum coloratum</i>) and bahiagrass (<i>Paspalum notatum</i> Flugge) are common dominants. Common broomweed (<i>Amphiachyris dracunculoides</i>), western ragweed (<i>Ambrosia psilostachya</i>), and hog croton (<i>Croton capitatus</i>) are common weedy herbaceous species. Post oak (<i>Quercus margarettae</i>), mesquite, eastern redcedar (<i>Juniperus virginiana</i>), blackjack oak (<i>Quercus marilandica</i>), water oak (<i>Quercus nigra</i>), and yaupon (<i>Ilex vomitoria</i>) are common woody species and may form sparse woodlands or shrublands in some areas.
CRP / Other Improved Grassland	4,648,976 (2.82%)	Mapping of this type is primarily for grassland cover within cropland landscapes. The type may consist of introduced species such as Mediterranean love grass (<i>Eragrostis barrelieri</i>), weeping love grass (<i>Eragrostis curvula</i>), or King Ranch bluestem, or planted native species such as little bluestem (<i>Schizachyrium scoparium</i>), buffalograss (<i>Bouteloua dactyloides</i>), and sideoats grama (<i>Bouteloua curtipendula</i>).
Edwards Plateau: Savanna Grassland	4,640,289 (2.81%)	Grassland condition varies for this mapped type, but many areas contain non-native King Ranch bluestem as an important species, and Bermudagrass is also frequent. Common native grasses include little bluestem, sideoats grama, silver bluestem (<i>Bothriochloa saccharoides</i>), Texas wintergrass (<i>Nassella leucotricha</i>), purple three-awn (<i>Aristida purpurea</i>), and common curly mesquite (<i>Hilaria belangeri</i>). Trees and shrubs are usually present and may include plateau live oak (<i>Quercus fusiformis</i>), Ashe juniper (<i>Juniperus ashei</i>), mesquite, agarito, and/or cedar elm (<i>Ulmus crassifolia</i>).
Blackland Prairie: Disturbance or Tame Grassland	4,228,285 (2.56%)	This type includes grasslands in many conditions; introduced grasses such as Bermudagrass and King Ranch bluestem are the most frequent dominant species. Shrubs or trees such as mesquite, cedar elm, eastern redcedar, sugar hackberry, and huisache (<i>Acacia farnesiana</i>) may be present, but typically have low cover.
Pineywoods: Pine Forest or Plantation	4,133,702 (2.50%)	Pines (<i>Pinus</i> sp.) are the most dominant tree species within this forest type covering over the lower, wetter bottomland areas in an extended stretch of rolling elevations. Common species include bald cypress (<i>Taxodium distichum</i>), long-leaf pine (<i>Pinus palustris</i>), southern magnolia (<i>Magnolia grandiflora</i>), flowering dogwood (<i>Cornus florida</i>), eastern redbud (<i>Cercis canadensis</i>), water oak, buttonbush (<i>Cephalanthus occidentalis</i>), American beautyberry (<i>Callicarpa Americana</i>), elms (<i>Ulmus</i> sp.), sweetgum (<i>Liquidambar styraciflua</i>), American beech (<i>Fagus grandifolia</i>), and a mix of other hardwood tree species.
South Texas: Clayey Mesquite Mixed Shrubland	3,986,302 (2.41%)	A discontinuous canopy of shrubs and small trees characterizes this type. Species such as mesquite, blackbrush (<i>Acacia rigidula</i>), huisache, granjeno (<i>Celtis pallida</i>), sugar hackberry, brasil (<i>Condalia hookeri</i>), guajillo (<i>Senegalia berlandieri</i>), lotebush, pricklypear, and whitebrush (<i>Aloysia gratissima</i>) are common components. Buffelgrass (<i>Pennisetum ciliare</i>) is a common herbaceous dominant.
Urban Low Intensity	3,706,303 (2.24%)	This type includes areas that are built-up but not entirely covered by impervious cover and includes most of the non-industrial areas within cities and towns.

Ecological System: Vegetation Type	Acres (%) within Plan Area	Description (TPWD 2018g)
Trans-Pecos: Creosotebush Scrub	3,332,666 (2.02%)	Mapping of this type is at low elevations within intermountain basins in the Trans-Pecos. Creosotebush (<i>Larrea tridentate</i>) is often the primary species. Other woody species may include mesquite, mariola (<i>Parthenium incanum</i>), catclaw acacia (<i>Senegalia greggii</i>), and whitethorn acacia (<i>Vachellia constricta</i>). Common succulents include Christmas cactus (<i>Cylindropuntia leptocaulis</i>), Torrey's yucca (<i>Yucca torreyi</i>), Engelmann pricklypear (<i>Opuntia engelmannii</i>), lechuguilla (<i>Agave lechuguilla</i>), and Opuntia species. Bush muhly (<i>Muhlenbergia porteri</i>), fluffgrass (<i>Dasyochloa pulchella</i>), burrograss (<i>Scleropogon brevifolius</i>), slim tridens (<i>Tridens muticus</i>), threeawns (<i>Aristida</i> sp.), and chino grama (<i>Bouteloua ramose</i>) are common grasses.
Gulf Coast: Coastal Prairie	3,157,094 (1.91%)	A variety of grasslands are covered by this mapped type, and species such as Bermudagrass, King Ranch bluestem, bahiagrass, deep-rooted sedge (<i>Cyperus entrerianus</i>), rat-tail smutgrass (<i>Sporobolus indicus</i>), broomsedge bluestem (<i>Andropogon virginicus</i>), little bluestem, bushy bluestem (<i>Andropogon glomeratus</i>), and brownseed paspalum (<i>Paspalum plicatulum</i>) may be dominant. Live oak (<i>Quercus virginiana</i>), cedar elm, sugar hackberry, and water oak (east) are common tree components, and shrubs such as huisache, Macartney rose (<i>Rosa bracteata</i>), mesquite, baccharis (<i>Baccharis neglecta</i>), or Chinese tallow (<i>Triadica sebifera</i>) may be present.
Edwards Plateau: Ashe Juniper / Live Oak Shrubland	3,134,454 (1.90%)	Ashe juniper and plateau live oak are the most frequent dominants of this evergreen shrubland. Plateau live oak and/or Ashe juniper may form a sparse canopy and Vasey oak (west) (<i>Quercus vaseyana</i>), white shin oak (<i>Quercus sinuate</i>), Mohr's shin oak (west) (<i>Quercus mohriana</i>), agarito, Texas persimmon (<i>Diospyros texana</i>), Texas mountain-laurel (<i>Sophora secundiflora</i>), mesquite, Lindheimer's pricklypear (<i>Opuntia lindheimeri</i>) may be common in the understory.
Post Oak Savanna: Post Oak Motte and Woodland	3,045,299 (1.84%)	Post oak is the most frequent dominant tree species within this mapped type. Cedar elm, blackjack oak, sugar hackberry, water oak, southern red oak (east) (<i>Quercus falcate</i>), black hickory (<i>Carya texana</i>), and plateau live oak may all be present in the overstory. Mesquite (west), yaupon, common persimmon (<i>Diospyros virginiana</i>), possumhaw (<i>Ilex decidua</i>), winged elm (<i>Ulmus alata</i>), gum bumelia (<i>Bumelia lanuginosa</i>), American beautyberry, and eastern redcedar are common shrubs.
Pineywoods: Upland Hardwood Forest	2,780,634 (1.68%)	Pines are the most dominant tree species within this forest type covering over the elevated upland areas in an extended stretch of rolling elevations. Common species include Loblolly pine (<i>Pinus taeda</i>), long-leaf pine, eastern red cedar (<i>Juniperus virginiana</i>), southern red oak, and a mix of other hardwood tree species.
High Plains: Shortgrass Prairie	2,744,400 (1.66%)	Buffalograss, blue grama (<i>Bouteloua gracilis</i>), tobosa (<i>Pleuraphis mutica</i>), and silver bluestem are common dominant grasses of this type. Other grasses may include hairy grama (<i>Bouteloua hirsute</i>), sideoats grama, western wheatgrass (<i>Pascopyrum smithii</i>), and purple threeawn (<i>Aristida purpurea</i>). Broom snakeweed (<i>Gutierrezia sarothrae</i>), mesquite, lotebush, wolfberry (<i>Lycium texanum</i>), pricklypear, and sand sage (<i>Artemisia filifolia</i>) are common woody components.
Crosstimbers: Savanna Grassland	2,703,091 (1.64%)	This type includes grassland in many different conditions, including areas dominated by non-native Bermudagrass and King Ranch bluestem with grazing-tolerant forbs such as broomweed and western ragweed, as well as areas with native species such as little bluestem, Texas wintergrass, Indiangrass (<i>Sorghastrum nutans</i>), silver bluestem, and sideoats grama. Mesquite (<i>Prosopis glandulosa</i>) is a common shrub, and this mapped type may include some areas with fairly dense mesquite cover.
Pineywoods: Disturbance or Tame Grassland	2,479,271 (1.50%)	Where human activity/ development has removed prior pineywood vegetation. Clearing of this vegetation type normally includes removal of all old growth trees and may be in a phase of succession with mixed grasses and forbes dominating the area and potentially some hardwood saplings beginning to regrow.

Ecological System: Vegetation Type	Acres (%) within Plan Area	Description (TPWD 2018g)
Trans-Pecos: Mixed Desert Shrubland	2,195,490 (1.33%)	This type is mapped on moderate slopes, usually in hills and low mountains rather than alluvial or colluvial desert basins. Shrub diversity is often relatively high, and common components include mariola, creosotebush, cenizo (<i>Leucophyllum frutescens</i>), guajillo, whitethorn acacia, skeleton-leaf golden eye (<i>Viguiera stenoloba</i>), mesquite, catclaw acacia, Torrey's yucca, lechuguilla, sotol (<i>Dasyllirion texanum</i>), pricklypear species, and ocotillo (<i>Fouquieria splendens</i>). To the south, species such as cenizo, guajillo, and blackbrush may be important.
Trans-Pecos: Hill and Foothill Grassland	2,173,982 (1.32%)	Mapping of this type is over gravelly or rocky, generally sloping soils that are not continuous and thus support a mixture of grasses, shrubs, and succulents. Important grasses may include sideoats grama, black grama (<i>Bouteloua eriopoda</i>), chino grama, tanglehead (<i>Heteropogon contortus</i>), threeawns, bush muhly, Arizona cottontop (<i>Digitaria californica</i>), and fluffgrass. Common shrubs include ocotillo, creosotebush, mariola, skeleton-leaf golden eye, and whitethorn acacia. Common succulents include Torrey's yucca, lechuguilla, sotol, Texas sacahuista (<i>Nolina texana</i>), Engelmann pricklypear, and other Opuntia and Echinocereus (small, ribbed cacti) species.
South Texas: Sandy Mesquite Woodland and Shrubland	2,146,043 (1.30%)	Relatively dense mesquite low woodlands are characteristic of this type. Shrub composition varies; granjeno, blackbrush, Texas hogplum (<i>Colubrina texensis</i>), brasil, colima (<i>Zanthoxylum fagara</i>), huisache, Texas persimmon, and whitebrush may be components. Overstory canopy is often sparse and contains species such as mesquite, huisache, Texas ebony (<i>Ebenopsis ebano</i>), and plateau live oak.
South Texas: Disturbance Grassland	2,034,118 (1.23%)	This type includes a variety of mainly heavily grazed grasslands, including managed exotic pastures. Common dominant species include buffelgrass, Bermudagrass, King Ranch bluestem, Kleberg bluestem (<i>Dichanthium annulatum</i>), guineagrass (<i>Urochloa maxima</i>), pink pappusgrass (<i>Pappophorum bicolor</i>), threeawn species, and red grama (<i>Bouteloua trifida</i>). Shrubs and small trees may include mesquite, huisache, blackbrush, lotebush, huisachillo (<i>Dichanthium annulatum</i>), and granjeno.
Edwards Plateau: Live Oak Motte and Woodland	1,879,829 (1.14%)	Plateau live oak alone or with Ashe juniper usually dominates the overstory of this type. Deciduous trees such as cedar elm, sugar hackberry, white shin (or Vasey) oak (<i>Quercus sinuate</i>). Lacey oak (<i>Quercus laceyi</i>), and Texas oak (<i>Quercus buckleyi</i>) may be components. Shrubs such as mesquite, Texas persimmon, and agarito are common.
Edwards Plateau: Juniper Semi-arid Shrubland	1,724,315 (1.04%)	Redberry juniper (<i>Juniperus pinchotii</i>) and Ashe juniper may both be present in this type, together with species such as plateau live oak, mesquite, Texas persimmon, Lindheimer pricklypear, Texas sotol, and agarito. Important grasses may include sideoats grama, purple threeawn, curly mesquite, slim tridens, hairy tridens (<i>Erioneuron pilosum</i>), and Texas wintergrass.

CHAPTER 4. ENVIRONMENTAL CONSEQUENCES

4.1 Definitions

NEPA requires that agencies include in their EISs a detailed statement of, among other things, the environmental impact of the proposed action and a description of unavoidable, adverse, environmental effects should the proposed action be implemented (42 USC 4332). NEPA regulations identify three types of effects: direct, indirect, and cumulative (40 CFR 1508.8). Direct effects are “caused by the action and occur at the same time and place.” Indirect effects are “caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable [and] may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems” (40 CFR 1508.8). Cumulative effects are those resulting from “the incremental environmental impact of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (Federal or non-Federal) or person undertakes such other actions” (40 CFR 1508.7).

4.2 Impact Estimation Approach

4.2.1 Quantification of Impacts

This EIS tiers to the incidental take estimates and effects discussion in the LCRA TSC HCP to describe and quantify impacts to Covered Species. As noted in Section 3.1.2, NEPA analysis is limited to only those resources that would be affected by LCRA TSC’s proposed incidental take and Conservation Program. Therefore, this EIS assumes that impacts to all other resources would be limited to the extent of take for Covered Species habitat, as described below.

Although Covered Species may occupy the same habitats and multiple species could be present at a given location and time, the programmatic nature of the LCRA TSC HCP and lack of known projects precludes a determination of whether this overlap will occur. Therefore, this EIS assumes that all incidental take would occur at different locations and times (i.e., no overlap).

- **Biotic resources:** Total estimated acres of impact was calculated by summing incidental take of all Covered Species that use surface terrestrial habitats, i.e., reptiles, mammals, birds, and the Houston toad (*Anaxyrus* [formerly *Bufo*] *houstonensis*).
- **Karst invertebrates:** Total estimated acres of impact was calculated by summing incidental take of all Covered Species that use surface and subsurface terrestrial habitats.
- **Aesthetics, Aquatic Resources, Cultural Resources, Socioeconomics, and Environmental Justice:** We discuss impacts to these resources qualitatively; not quantitatively.

4.2.2 Impact Framework

In this EIS, we describe potential impacts based on a scale ranging from negligible to significant (Table 12). The purpose of establishing this impact framework was two-fold: 1) to provide a uniform method for assessing project effects over a variety of resources; and 2) to provide a clear and concise means of categorizing potential project effects for the public and agency decision-maker.

Table 12. Impact Classification

Impact Classification	Definition*
Negligible	Effects on the evaluated resource are so small as to be often undetectable.
Minor	Effects on the evaluated resource are detectable but fall well below the identified threshold(s) for the resource.
Moderate	Effects on the evaluated resource are readily apparent with a measurable change from baseline conditions, but would remain below the identified threshold(s) for the resource and would recover within a moderate amount of effort or time.
Significant	Effects on the evaluated resource would exceed the identified threshold(s) for the resources and require extensive restoration or mitigation to offset adverse impacts.

*Applied mitigation measures may reduce minor effects to a negligible impact.

4.3 Reasonably Foreseeable Projects

The Proposed Federal Action is issuance of an ITP under section 10(a)(1)(B) of the Act that would authorize incidental take of the Covered Species over a period of 30 years. This EIS also examines other likely trends and reasonably foreseeable projects that could, along with the Proposed Federal Action, cumulatively result in adverse effects to the human environment. Table 13 provides a list of some of the types of projects and activities within the Plan Area that are reasonably foreseeable over the 30-year ITP.

Table 13. Reasonably Foreseeable Projects During the ITP

Reasonably Foreseeable Project Category	Description
Transportation	<p>Estimates of Texas' population predict an increase to 45 million people between 2014 and 2040. During the same period, daily vehicle miles traveled are expected to increase by 300 million miles to 800 million total miles by the year 2040; up more than 60 percent from the 500 million miles that were driven on the state-maintained system in 2012 (Texas Economic Development 2018).</p> <ol style="list-style-type: none"> 1. Highways – Pavement. Investments to achieve roadways that are pothole free and support a smooth ride (\$103.7 billion projected expenditure through 2040) 2. Highways – Bridge/Culvert. Investments to achieve bridges that are structurally sound and open for use (\$40 billion projected expenditure through 2040) 3. Transit. Investments that result in buses, trains, and associated facilities in all areas of the state that are comfortable and reliable for existing assets (\$101.2 billion projected expenditure through 2040) 4. Passenger Rail. Costs to construct and operate two new high-speed rail systems from Oklahoma City to south Texas and from Dallas-Fort Worth to Houston; costs to expand existing AMTRAK services (\$21 billion projected expenditure through 2040) 5. Bicycle and Pedestrian. Transportation plans compiled to develop needs along with information from recreation agencies and interest groups on opportunities for expansion; additional \$0.4 billion needed for rural areas (\$2.19 billion projected expenditure through 2040) 6. Aviation. Costs reported to Texas Department of Transportation by Commercial Services and General Aviation airports (\$20.4 billion projected expenditure through 2040) 7. Intelligent Transportation Systems (ITS). Costs to operate/ maintain/ replace existing ITS devices and to implement/ operate/ maintain future planned devices (\$13 billion projected expenditure through 2040) 8. Non-Highway Freight. In addition to highway bottleneck reduction and all pavement and bridge needs, additional freight needs include private needs for rail and ports (\$5.7 billion projected expenditure through 2040)

Reasonably Foreseeable Project Category	Description
Water	<p>Estimates of Texas' population predict an increase to more than 70 percent between 2020 and 2070, from 29.5 to 51 million, with over half of this growth occurring in the Dallas-Fort Worth and Houston regions. Projections of water demand predict an increase of 17 percent, from 18.4 million acre-feet per year to 21.6 million acre-feet (TWDB 2017). Percent change of annual water demand by category (2020–2070):</p> <ul style="list-style-type: none"> • Irrigation: -18% • Municipal: 62% • Manufacturing: 39% • Steam-electric: 83% • Livestock: -15% <p>TWDB predicts a decline of existing water supplies by approximately 11 percent between 2020 and 2070, from 15.2 to 13.6 million acre-feet per year. Various regional and local water providers expect to meet this increased demand through a combination of strategies including conservation, reuse, and new water supplies implemented by (TWDB 2017).</p>
Energy	<p>Texas has the second-largest population and the second-largest economy after California (U.S. Census Bureau 2016). In response to this relatively large population, the state leads the nation in total energy consumption, accounting for more than 12 percent of the U.S. total. Texas leads the nation in energy production, primarily from crude oil and natural gas, which provided more than 20 percent of domestically produced energy (U.S. Energy Information Administration [EIA] 2015).</p> <p>Electricity demand and subsequent power supply have been increasing in recent years (Electric Reliability Council of Texas [ERCOT] 2016; EIA 2017). The increasing population, along with increasing energy demands, will likely require development of future energy projects. The Texas State Energy Plan (Department of Energy 2008) encourages a diverse mix of energy sources (coal, nuclear, wind, natural gas) to meet this demand.</p>
Land Development	<p>Statewide land cover/use type data are available for 2001, 2006, and 2011 as part of the National Land Cover Dataset (Homer et al. 2015) for an area of approximately 268,571 square miles in Texas. Between 2001 and 2011, developed lands in Texas increased by 0.4 percent (1,037 square miles). Pasture and croplands increased by 0.1 percent (126 square miles). Natural land cover types have decreased by 0.5 percent (1,163 square miles). Quantitative predictions of long-term conversion of natural land cover types (e.g., vegetation, open water, and wetlands) to developed uses and agriculture are not possible based on available data. However, it is reasonable to anticipate increased land development and decreased natural land cover based on expected regional population growth.</p>
Agriculture/Forestry	<p>Annual farm operations described by acres operated in Texas as reported to the U.S. Department of Agriculture (USDA) fell from approximately 133,500,000 acres in 1993 to approximately 129,500,000 acres in 2017. Recent crop production in Texas has fluctuated and slightly declined since 2007 (\$8.6 billion), with notable dips in 2008-2009 and 2011 and an apparent relative stabilization between 2012 and 2016 at approximately \$7 billion (USDA National Agricultural Statistics Service 2018).</p>
Utilities/Communication	<p>The PUC, which regulates the state's electric, telecommunications, and sewer utilities, does not maintain a complete statewide plan for utility improvement projects; therefore, a quantifiable discussion on utility projects is not possible. However, as Section 3.8 indicates, population growth is likely in the Plan Area, which would increase future demand for utility services and associated infrastructure. Additionally, at least seven electrical transmission system upgrade projects are anticipated through 2022 (ERCOT 2016) largely focused on population centers including Houston, Austin, San Antonio, the Rio Grande Valley and Central/West Texas.</p>
Recreation/Open space	<p>Planned improvement projects for Texas State Parks (TPWD 2018h) (as of 12/8/2017) totaled \$49 million. Capital funding from previous legislative sessions was \$90.6 million in 2016, \$11 million in 2014 and \$23 million in 2012 (TPWD 2018h). There are 254 counties and 25 metropolitan areas (areas with over 100,000 people) in Texas (U.S. Census Bureau 2010). A comprehensive project list for these governmental agencies is not available; however, expectations for most will likely plan future recreation and open space improvement projects.</p>

4.4 Effects Analysis

Service guidance concerning NEPA analyses associated with ITP issuance states that the Service's ability to exercise discretion over an ITP applicant's non-Federal activities is limited to

ensuring the non-Federal entity's permit application meets the statutory and regulatory criteria in the Act. This means that our ability to exercise control and responsibility over an applicant's non-Federal activities under the Act is limited to what is "necessary or appropriate for purposes of the plan" (50 CFR 17.22 [b][1][iii][D]). This interpretation is consistent with the basic tenet that the Service does not authorize the applicant's underlying activities causing the incidental take, but rather authorizes the take resulting from the applicant's activities (Service and NMFS 2016). Therefore, this EIS addresses only those effects caused by the Service's issuance of the proposed ITP.

4.4.1 Aesthetics

4.4.1.1 ALTERNATIVE A – ISSUANCE OF SECTION 10(A)(1)(B) PERMIT

Covered Activities that have potential to affect aesthetics include the construction of new overhead transmission lines and towers or poles, electric substations and switching stations, and access roads. These actions could result in vegetation removal or modification; surface disturbance; and increased human presence, such as additional vehicle or equipment use and nighttime lighting. Impacts would begin with construction during the initial introduction of equipment and persist long-term within line-of-sight areas, until decommissioning and subsequent revegetation.

The intensity of aesthetic impacts from these short- to long-term actions would vary based on site-specific conditions. The current condition of the area impacted influences the magnitude of aesthetic changes (e.g., extent of existing impacts such as other utility lines, density of vegetation that might affect visibility, local topography, or visibility). Covered Activities that occur a greater distance from publicly accessible vantage points, or in areas with limited visibility due to available lighting, existing vegetation, or local topography would result in fewer impacts to viewers. This EIS assumes that impacts would be most severe when a viewer is able to see Covered Activities from a visually sensitive publicly accessible protected area (i.e., Federal, state, or local parks or other protected lands identified in Section 3.2). However, given the uncertainty surrounding the exact location of Covered Activities, effects to publicly protected areas are unknown.

Because of the low occurrence of visually sensitive areas within the Plan Area (see section 3.2 and Table 6 above) and considering Covered Activities would predominately occur on private lands, most aesthetic impacts are not anticipated to occur within visually sensitive, publicly accessible areas. Almost half (43 percent) of total estimated surface disturbance associated with the Covered Activities is anticipated to occur within previously disturbed settings (see Section 2.1.6). Proposed minimization measures in the LCRA TSC HCP would also reduce visual impacts, as possible, through efforts to minimize surface disturbance and removal of woody vegetation. Additionally, Public Utility Regulatory Act Section 37.056 (c)(4)(C) includes "historical and aesthetic values" as a factor in granting or denying a CCN. The PUC may evaluate aesthetic values differently in any given case, but typically considers factors such as length of proposed transmission line within the foreground visual zone (0.5 mile unobstructed) of parks and recreational areas, US and state highways, and FM roads. The PUC's routing criteria in 16 Tex. Admin. Code 25.101(b)(3)(B) are designed to moderate impacts on the affected community and landowners, to the extent possible, by encouraging the paralleling or utilization of existing transmission line ROW, paralleling of existing roadways, railroads, and other utility

ROW, and paralleling of property lines and other natural or cultural features. LCRA TSC also considers aesthetics during the environmental assessment/alternative route analysis phase for each new transmission line based on criteria that give an area its aesthetic identity, such as: topographical variation, prominence of water in the landscape, vegetation variety, diversity of scenic elements, degree of human development or alteration, and overall uniqueness of the scenic environment compared with the larger region. Therefore, aesthetic impacts associated with Covered Activities would likely be minor to moderate, depending on their location.

4.4.1.2 ALTERNATIVE B – REDUCED PERMIT DURATION

Under Alternative B the same types of aesthetic impacts would occur as those described for the Proposed Federal Action. Therefore, impacts would be localized and minor to moderate.

4.4.1.3 ALTERNATIVE C – NO ACTION

Under the No Action Alternative, the Service would not issue the requested ITP and LCRA TSC would be responsible for compliance with the Act on a project-by-project basis. This EIS assumes that all forecasted future development would occur and that surface disturbance would be as described in Section 2.1.6. Under the No Action Alternative, however, LCRA TSC could choose to alter project footprints or schedules to avoid potential incidental take if obtaining an individual ITP or coverage under a section 7 consultation is not feasible.

Because LCRA TSC would still perform the same activities described in Alternative A, Alternative C would likely result in the same types of impacts to aesthetic resources. Therefore, impacts would be localized and minor to moderate.

Under the No Action Alternative, LCRA TSC would not provide minimization or mitigation for incidental take of Covered Species habitat through implementation of the LCRA TSC HCP. If LCRA TSC seeks an individual ITP(s) or section 7 consultation for project-specific activities, then they would be required to provide project-specific minimization and/or mitigation measures to offset incidental take pursuant to sections 7 and 10 of the Act and relevant regulations. Because any minimization or mitigation measures would be at a smaller, project-specific scale, and could be less comprehensive compared to a programmatic ITP, this EIS anticipates that aesthetic resources could experience a reduced indirect benefit under Alternative C when compared to the Proposed Federal Action.

4.4.1.4 CUMULATIVE IMPACTS

Past and present actions (for example, population growth, urban/suburban/extra-urban development, energy development, agricultural operations, water development, and infrastructure growth) have contributed to changes in the Plan Area (see Table 13 for a detailed list and explanation). Future development and urbanization within the Plan Area, as indicated by projected population increases (see Section 3.8), could result in additional conversion from natural to more developed views.

Under all alternatives, including the No Action Alternative, Covered Activities considered in this EIS would contribute up to a conservatively estimated maximum of 14,159 acres of terrestrial surface disturbance, which would result in new views of overhead transmission lines and towers or poles, substations and switching stations, and access roads. The minimization and mitigation

provided under the LCRA TSC HCP would result in potential for management of existing conservation lands and protection of larger, contiguous tracts of land with greater conservation value than would be achieved if similar acreage occurred on a project-by-project basis. Therefore, cumulative impacts to aesthetics would be minor across the plan area with potentially moderate impacts in local areas.

4.4.2 Aquatic Resources

4.4.2.1 ALTERNATIVE A – ISSUANCE OF SECTION 10(A)(1)(B) PERMIT

The following section briefly summarizes the likely direct and indirect impacts to aquatic resources by Covered Activities.

Surface Waters

The primary direct impact to surface waters associated with Covered Activities would be potential sedimentation from erosion of exposed soils during vegetation removal or soil disturbance, as well as pollution in the unlikely event of herbicide overspray or an accidental spillage of petroleum products (e.g., fuel, lubricants, solvents) or other chemicals. Water quality is adversely correlated with vegetation removal and increased impervious cover (e.g., USGS 1999; Brant and Kauffman 2000; Ging 1999; Bush et al. 2000). Covered Activities that modify or remove vegetation within floodplains and along riparian areas could alter the temperature of surface water habitat or change drainage patterns in ways that alter water flow and/or quantity or result in downstream impacts including increased erosion (Alberti et al. 2006).

Direct habitat modifications of surface habitat is unlikely as LCRA TSC is able, in most circumstances, to span waterways and avoid the need to place fill or excavate through a stream or other water body. However, in some circumstances, impacts near the edge of a waterbody could occur. However, any impacts would be localized and short-term, as LCRA TSC would, per the LCRA TSC HCP and typical PUC requirements, minimize such disturbances to the extent necessary to safely perform the Covered Activity, and revegetate and restore disturbed areas to preconstruction contours with a seed mix certified by the USDA and approved by the landowner, with a priority on native mixes. In addition, the TCEQ currently requires construction activities greater than one acre in size to implement a Stormwater Pollution Prevention Plan (SWPPP), which would include implementation and monitoring of various best management practices (BMPs) such as the installation of silt fences, mulch logs, side drainage ditches, culverts, and potentially other TCEQ-approved mechanisms to minimize aquatic impacts (TCEQ 2018; Jaber 2008). Therefore, impacts to surface aquatic habitat would be localized, short-term, and minor.

Groundwater

According to the BEG (2004), surface hydrographic features across the Plan Area can contribute water to groundwater aquifers through fissures in the limestone bedrock. Across that state, aquifers vary in type and size but universally rely on recharge from rainwater. Groundwater levels in all major and minor aquifers have declined from predevelopment levels (BEG 2004; Bruun et al. 2016). Covered Activities that remove surface vegetation cover completely (bare ground) and/or replace existing cover with impervious surfaces could reduce precipitation infiltration, thereby reducing groundwater recharge, as well as increase potential for contaminants to enter the aquifer (Bush et al. 2000; BEG 2004; Service 1996a, 2008). These impacts would be localized and short- (vegetation regrows or is planted) to long-term (permanent

impervious cover) but minimized through implementation of SWPPP BMPs and adherence to state and local groundwater regulations. Therefore, impacts to groundwater would be minor.

Mitigation

Where avoidance of impacts to aquatic resources from Covered Activities is not possible, LCRA TSC would implement minimization (Section 2.1.8.1) and mitigation (Section 2.1.8.2) measures identified in the LCRA TSC HCP. Although the intent of these measures is to protect Covered Species, aquatic habitats associated with Covered Species could experience an indirect benefit through the potential long-term and region-wide programmatic protection and/or or maintenance of suitable aquatic habitat (Service 2015a).

In cases where practicable opportunities for on-the-ground conservation actions may not currently exist, or minimization and mitigation measures are unknown, LCRA TSC would work with the Service to identify alternative measures to support recovery actions for Covered Species (and associated biotic resources).

4.4.2.2 ALTERNATIVE B – REDUCED PERMIT DURATION

Alternative B would result in the same types of direct and indirect impacts to aquatic resources as described for Alternative A. However, under this scenario, impacts would only occur within a 15-year ITP. Impacts to aquatic habitat would be localized, short- or long-term, and minor, as with Alternative A. Alternative B would also implement the same types of minimization and mitigation measures as Alternative A, but mitigation would be only half of that proposed under Alternative A due to reduced authorized incidental take.

After the 15-year ITP expired, LCRA TSC would seek additional authorization from the Service on a project-by-project basis to ensure compliance with the Act for facilities upgrades and maintenance tasks. During each permit application process, the Service would evaluate the Covered Activities, Covered Species, and the proposed Conservation Program and determine whether avoidance, minimization, and mitigation measures are to the maximum extent practicable.

4.4.2.3 ALTERNATIVE C – NO ACTION

Because LCRA TSC would still perform the same activities described in Alternative A, Alternative C would likely result in the same types of direct and indirect impacts to aquatic habitat. LCRA TSC would continue to avoid surface aquatic features by spanning such areas, where feasible, and comply with state and local groundwater regulations. Therefore, impacts to water resources would be localized, short- to long-term, and minor.

Under the No Action Alternative, LCRA TSC would seek individual ITP(s) or section 7 consultations for project-specific activities, that would cause take, and LCRA TSC would be required to provide project-specific minimization and/or mitigation measures to offset such take. Because any minimization or mitigation would be at a smaller, project-specific scale, and would be less comprehensive compared to a programmatic ITP, this EIS anticipates that aquatic habitat would experience a reduced indirect benefit when compared to the Proposed Federal Action.

4.4.2.4 CUMULATIVE IMPACTS

Past and present actions have contributed to aquatic habitat loss or alteration (in quality or quantity) due to a variety of factors such as urban/suburban/extra-urban development, energy development, agricultural operations, water development, and infrastructure growth (see Table 13). With historic and forecasted population growth within the Plan Area, the TWDB can project potential impacts to water resources from future actions (described in Section 3.8). The TWDB projects water demand, based on the future population growth, will increase by 17 percent, from 18.4 million acre-feet per year to 21.6 million acre-feet (TWDB 2017).

Population growth also results in changing land cover trends. Between 2001 and 2011 developed lands in Texas increased by 0.4 percent (1,037 square miles). Pasture and croplands increased by 0.1 percent (126 square miles). Natural land cover types have decreased by 0.5 percent (1,163 square miles). Construction activities associated with land development, such as grading soil, soil compaction, altering the existing topography, paving surfaces, and constructing buildings and other structures, will result in further land conversion. Texas Land Trends (2014) reports that total land conversion occurred predominately in the state's 25 fastest growing counties from 1997 to 2012, with 590,000 acres converted from agricultural to non-agricultural uses.

Expectations are that these ongoing trends will occur under all alternative scenarios and could contribute additional sources of sedimentation and pollution, when considered in conjunction with other past, present, and reasonably foreseeable projects. However, implementation of the minimization and mitigation measures described in the Proposed Federal Action (Alternative A) or the Reduced Permit Duration (Alternative B) would reduce LCRA TSC's contribution to cumulative aquatic habitat effects by ensuring that Covered Species habitat lost or otherwise impacted over the next 15 to 30 years would be minimized and mitigated to the maximum extent practicable. Furthermore, the minimization and mitigation provided under the LCRA TSC HCP would result in potential for management of existing conservation lands and protection of larger, contiguous tracts of land with greater conservation value than on a project-by-project basis. Additionally, LCRA TSC will adhere to applicable state and local water quality and water protection regulations. These include, but are not limited to, the Edwards Aquifer Rules, requirements for the creation and implementation of SWPPPs, and local restrictions on impervious cover. Therefore, effects could be long-term, but negligible to minor.

4.4.3 Covered Species

4.4.3.1 ALTERNATIVE A – ISSUANCE OF SECTION 10(A)(1)(B) PERMIT

The LCRA TSC HCP (Chapter 5 and Appendix D) describe potential direct and indirect effects to Covered Species from Covered Activities, but are summarized in Table 14 for reader convenience. As shown in Table 14, LCRA TSC's requested take would impact a very small percentage of the total amount of habitat within the range of each Covered Species. For many Covered Species, the requested take would be less than 0.2 percent, and the maximum would be only 0.7 percent of potential habitat within the Plan Area. Under this alternative, LCRA TSC would also implement all conservation measures described in the LCRA TSC HCP. Therefore, effects would be short- and long-term, and minor to moderate.

4.4.3.2 ALTERNATIVE B – REDUCED PERMIT DURATION

Alternative B would result in the same types of direct and indirect impacts to Covered Species as described for Alternative A. Therefore, effects could be short- or long-term and minor to moderate. However, under this scenario, impacts would only occur within a 15-year ITP.

This alternative reduces by half the maximum estimated incidental take compared to the Proposed Federal Action (see Table 4 in Section 2.2). Potential species benefits associated with the implementation of minimization and mitigation measures would be as described for the Proposed Federal Action and would meet the ITP issuance criteria set forth in section 10 of the Act and relevant regulations. However, because mitigation would be half of that estimated for Alternative A, this EIS anticipates that Covered Species would experience a reduced benefit, as compared to the Proposed Action. After the 15-year ITP expired, LCRA TSC would seek additional authorization from the Service on a project-by-project basis to ensure ESA compliance for facilities upgrades and maintenance tasks. During each permit application process, the Service would evaluate the Covered Activities, Covered Species, and the proposed Conservation Program and determine whether avoidance, minimization, and mitigation measures are to the maximum extent practicable.

4.4.3.3 ALTERNATIVE C – NO ACTION

Alternative C would result in the same types of direct and indirect impacts to Covered Species as described for Alternative A. Therefore, effects could be short- or long-term and minor to moderate. However, under the No Action Alternative, LCRA TSC would still have to consult on a project-by-project basis under section 7 or 10 if incidental take were likely to occur. If LCRA TSC sought an individual ITP under this alternative, then they would be required to provide project-specific minimization and/or mitigation measures to offset incidental take. Any minimization and/or mitigation measures likely would be at a smaller, project-specific scale than that provided under the Proposed Federal Action. Therefore, this EIS anticipates that Covered Species could experience a reduced benefit, as compared to the Proposed Federal Action.

4.4.3.4 CUMULATIVE IMPACTS

The predominant cumulative impacts to Covered Species would be the removal or disturbance of suitable habitat from Covered Activities, combined with unrelated past, present, and reasonably foreseeable future activities. Potential reasonably foreseeable trends in the Plan Area include additional water and energy development, urban development, and road maintenance and construction activity, as well as ongoing agriculture (see Table 13).

Table 14. Summary of Covered Species Impacts

Covered Species	Incidental Take Estimate (acres)	Incidental Take as % of Potential Habitat in Plan Area	Potential Direct and Indirect Impacts
BIRDS			
Golden-cheeked Warbler	8,396	0.20%	<ul style="list-style-type: none"> Covered Activities involving clearing of canopy habitat could reduce the amount of habitat available for use by the species.
Red-cockaded Woodpecker	528	0.02%	<ul style="list-style-type: none"> Fragmentation could reduce habitat patch sizes below the threshold used by the golden-cheeked warbler and red-cockaded woodpecker, which could cause abandonment of a territory or cluster. However, habitat loss at the scale of a linear ROW less than 200 feet in width is not likely to fragment red-cockaded woodpecker (<i>Picoides borealis</i>) foraging habitat because individuals will regularly fly across such distances (Jackson 1994). Machinery operating in or adjacent to occupied habitat during the breeding season could impact nests. Forest canopy individuals would be unlikely to contact localized applications of herbicides to control vegetation within ROWs. Noise and activity disturbances during the conduct of Covered Activities could disturb or displace individuals if performed in or adjacent to nests or roosting cavities. However, recent studies by Lackey et al. (2011) and Pruett et al. (2014) found road construction noise and activity have no effect on golden-cheeked warbler pairing success, territory placement, or productivity. Changes to potential predator populations may be possible if ROWs cross-occupied patches of previously unfragmented woodland. Supporting Reference Sources: Peak (2007); Peak and Thompson (2014); Reidy et al. (2009); Service (2003b, 2006); see also Appendix D of the LCRA TSC HCP.
Whooping Crane	1,973	0.53%	<ul style="list-style-type: none"> Covered Activities would not significantly change the character of the open marsh and upland habitats used by whooping crane (<i>Grus americana</i>) during the winter. However, any potential habitat loss and degradation due to coastline development threatens Rufa red knot (<i>Calidris canutus rufa</i>) and piping plover (<i>Charadrius melodus</i>).
Piping Plover	129	0.05%	<ul style="list-style-type: none"> Habitat fragmentation and edge effects would not be a significant concern for coastal species.
Rufa Red Knot	129	0.05%	<ul style="list-style-type: none"> Whooping cranes and piping plovers have collided with distribution lines, especially as juveniles, resulting in injury or death (see also Chapter 9.1.1 of the LCRA TSC HCP), but marking the lines located within or near to their habitat could reduce this risk. Collision with equipment and machinery used during Covered Activities is unlikely because whooping cranes on their wintering grounds are fully mobile individuals and Rufa red knot and piping plover are capable fliers and would likely move away from people and operating equipment during the conduct of Covered Activities. LCRA TSC does not anticipate using localized applications of herbicides to control vegetation within ROWs in areas used by coastal species. Noise and activity disturbances from the conduct of Covered Activities, during the wintering season, could disturb individuals and/or temporarily displace them from preferred feeding or resting sites. Covered Activities are not expected to significantly change land uses or land covers adjacent to ROWs. Therefore, populations of invertebrate prey are also not expected to significantly change. The addition of new transmission lines could increase the number of perches for predatory raptors, which could increase predation risk.

Covered Species	Incidental Take Estimate (acres)	Incidental Take as % of Potential Habitat in Plan Area	Potential Direct and Indirect Impacts
			<ul style="list-style-type: none"> Supporting Reference Sources: CWS and Service (2005); Stehn and Wassenich (2008); Service (1996b, 2003c, 2009, 2012b, 2014a, 2015b); Zonick (2000); see also Appendix D of the LCRA TSC HCP.
REPTILES			
Spot-tailed Earless Lizard	1,750	0.02%	<ul style="list-style-type: none"> Covered Activities could replace some areas of suitable habitat for spot-tailed earless lizard (<i>Holbrookia lacerata</i>) with structure, but vegetation clearing and soil disturbance could also promote sparse, short herbaceous vegetation and small areas of disturbed soils that are used by the species to burrow, forage, and thermoregulate once construction is complete (TPWD 2017i). Covered Activities are unlikely to fragment the open habitat used by spot-tailed earless lizard, create barriers to dispersal, or introduce novel edge effects to adjacent habitats. Equipment and machinery activity could physically kill or wound individuals present with ROWs. Reductions of prey items or direct toxicity by applied herbicides could occur if home ranges overlap with ROWs. Long-duration, daytime disturbances could cause individual spot-tailed earless lizards to remain under cover for extended periods, forgoing foraging and other normal behaviors. Covered Activities would not cause significant changes to predator communities. Supporting Reference Sources: Service (2011b); see also Appendix D in the LCRA TSC HCP.
MAMMALS			
Ocelot	230	0.29%	<ul style="list-style-type: none"> Removal of dense thornscrub within ROWs would reduce available habitat for ocelots (<i>Leopardus pardalis</i>). Fragmentation of remaining patches could render remaining patches unusable or less suitable for ocelots. Adverse edge effects, aside from fragmentation, are not likely. Collision is not expected from conduct of the Covered Activities because vehicular travel within ROWs occurs via unimproved access roads where slow travel speeds are required. Ocelots are sensitive to human activity and mobile individuals would be expected to move away from active construction. Likewise, females would likely move kittens to alternate den sites before collisions occur. Ocelots use a large home range and the limited application of herbicides would not likely affect an individual's home range. Relatively short periods of noise or human activity are not likely to disturb ocelots because mobile individuals may simply move to another part of their large home range. Ocelots rarely use the same daytime resting site on consecutive days, unless denning. Likewise, females would likely move kittens to alternate den sites away from noise and activity. Covered Activities are unlikely to significantly alter ocelot prey populations, because of the relatively narrow linear corridors associated with most facilities and land uses that remain relatively similar to the surrounding landscape (Murray and Gardner 1997; Horne et al. 2009; Haines et al. 2005). Supporting Reference Sources: Harveson et al. (2004); Tewes et al. (1995); Service (2016b); see also Appendix D in the LCRA TSC HCP.

Covered Species	Incidental Take Estimate (acres)	Incidental Take as % of Potential Habitat in Plan Area	Potential Direct and Indirect Impacts
INVERTEBRATES			
Bee Creek Cave harvestman	88	0.04%	<ul style="list-style-type: none">Covered Activities involving excavation could result in the permanent loss of habitable karst voids. Clearing trees from ROWs could degrade karst habitat by altering the amount or composition of nutrient inputs to the subsurface environment or altering the subsurface climate through additional sun exposure at the ground surface.Removal of surface vegetation in the vicinity of caves and karst features could also adversely impact an important function of these features in that they provide habitat and food for the animal communities that contribute nutrients to the karst ecosystem (such as cave crickets, small mammals, and other vertebrates).Covered Activities involving excavation could fragment previously connected subsurface voids, disrupting the movement of individuals or the flow of air, moisture, and nutrients used by these species. Edge effects are possible when karst voids adjacent to excavated areas are open to the surface climate, thereby changing the temperature and moisture regime of the adjacent voids for an unknown distance. Edge effects would likely be temporary and cease once excavated areas were backfilled and no longer directly exposed to the surface.Equipment or rubble could collide with and kill or wound an individual, if an individual is present in a void during excavation of the surrounding karst matrix.Direct toxicity of applied herbicides to individuals or their prey is possible.Vegetation and soil disturbances associated with the Covered Activities could facilitate the invasion or proliferation of tawny crazy ants (<i>Nylanderia fulva</i>) and red imported fire ants (<i>Solenopsis invicta</i>), which represent a threat to endangered karst fauna via predation or competition (Service 2011a).Supporting Reference Sources: Crawford and Senger (1988); Reddell (1993), Service (1994, 2011c, 2011d, 2011e, 2011f, 2012c); White (1988); see also Appendix D in the LCRA TSC HCP.
Tooth Cave spider	10	0.07%	
Tooth Cave ground beetle	14	0.06%	
Madla Cave meshweaver	10	0.05%	
Government Canyon Bat Cave spider	10	0.05%	
Helotes mold beetle	10	0.05%	
<i>Rhadine exilis</i>	10	0.05%	
<i>Rhadine infernalis</i>	10	0.05%	
Comal Springs riffle beetle	1	<0.01%	
Peck’s Cave amphipod	1	0.72%	
AMPHIBIANS			
Houston Toad	1,024	0.08%	<ul style="list-style-type: none">Removal of tree canopy from ROWs or addition of roads and structures could degrade habitat quality or cause the loss of potential resting or wintering sites.Collision of Houston toads with vehicles, machinery, or equipment is possible when individuals are present within ROWs during the conduct of Covered Activities, particularly during initial vegetation clearing in wooded areas.Reductions of prey items or direct toxicity to applied herbicides or accidental releases of hazardous materials is unlikely due to narrow linear corridors and limited potential for occurrence within ROWs post-clearing.Houston toads are not known to be affected by noise or activity disturbances.

Covered Species	Incidental Take Estimate (acres)	Incidental Take as % of Potential Habitat in Plan Area	Potential Direct and Indirect Impacts
Barton Springs salamander	5	0.51%	<ul style="list-style-type: none"> Clearing trees from riparian areas could alter the temperature of surface water habitat and degrade habitat quality. Soil disturbance along occupied spring runs could introduce sediment to the aquatic habitat and degrade habitat quality. Subsurface excavations, particularly for transmission tower footings, could intercept or alter groundwater flow paths and cause the loss of subsurface habitat. Although LCRA TSC will avoid alterations to most aquatic habitats, it is possible that Covered Activities could cause the loss or degradation of breeding habitat through direct modification of the vegetation or soil surface or by changing drainage patterns in ways that reduce subsurface habitat (Service 2012). Direct toxicity of applied herbicides to individuals or their prey is possible and could have direct toxicity to individuals or could cause the loss or degradation of habitat for extended periods. Covered Activities are unlikely to significantly alter prey or predator populations because LCRA TSC is expected to avoid altering surface aquatic environments by spanning such areas. Supporting Reference Sources: Duarte et al. (2011); Service (2011g, 2012a, 2013b, 2013c, 2014b); see also Appendix D in the LCRA TSC HCP.
Georgetown salamander	3	0.29%	
Jollyville Plateau salamander	16	0.37%	
Salado Springs salamander	1	0.27%	
San Marcos salamander	2	0.54%	

As described in Section 4.4.7.4, the TWDB predicts population growth to increase by 70 percent between 2020 and 2070. As a result, infrastructure needs across Texas will grow. For example, in 2017, Texas added \$9 billion in new funding for 230 transportation projects across the state (Houston Chronicle 2017). To date, transportation improvements in Texas have not kept up with the pace of population growth having a significant impact on Texas commuters. According to the 2017 Infrastructure Report Card (American Society for Civil Engineers 2018), Texas received a final grade of “C-”, representing a lower grade than the last review in 2012. Texas received a “D+ or below” grade for several infrastructure categories, including dams, drinking water, flood control, roads and highways, and wastewater. These areas will require attention by state lawmakers if the state is going to continue to accommodate projected population growth. The state’s infrastructure needs, along with land use changes, will continue to affect Covered Species habitats. Although the exact extent and location of these changes cannot be accurately predicted, it is likely that habitats surrounding the largest growing urban areas will experience the greatest impacts.

Tables 14 and 15 in the LCRA TSC HCP provide estimates of incidental take by Covered Species, as well as incidental take as a percentage of potential habitat in the Plan Area. Habitat modification associated with Covered Activities would represent less than 1 percent of potential habitat within each Covered Species’ range within the Plan Area. Additionally, under Alternative A (Proposed Federal Action) and Alternative B (Reduced Permit Duration) LCRA TSC would implement conservation measures described in the LCRA TSC HCP. Therefore, LCRA TSC would minimize and mitigate to the maximum extent practicable, which reduces their contribution to cumulative effects. Therefore, cumulative effects would be short- or long-term, and minor to moderate.

4.4.4 Cultural Resources

4.4.4.1 ALTERNATIVE A – ISSUANCE OF SECTION 10(A)(1)(B) PERMIT

Covered Activities could result in two types of impacts to historic properties and cultural resources: below-ground to ground-surface disturbances, and aboveground disturbances and intrusiveness. During new construction, upgrading and development, O&M, or emergency responses, some Covered Activities under Alternative A would involve ground-disturbing activities that have the potential to cause direct physical impact to historic properties present within the area of disturbance. These activities include E&S controls, vegetation clearing, surface grading, trenching and boring, installation of structures, post-construction restoration, vehicular access, and grading and leveling. Ground disturbances in areas with archaeological sites, human burial remains, or sites of religious and traditional cultural significance to Native American Tribes, could physically impact these resources through the mixing, damage, destruction, or otherwise altering of cultural materials or values. Ground disturbance could also expose buried archaeological deposits to weathering and erosion that may diminish archaeological value and result in the loss of cultural materials, or impact historic structures by causing structural damage or altering the historic character of the resource.

Clearing and the placement of aboveground structures have the potential to affect important aspects of the historic setting (for properties for which historic setting remains important). Structure height, profile, and discernibility within the historic setting of historic properties can all present incongruities with that setting that diminish the historic integrity of the resource (i.e., the

ability of the resource to convey its historic significance). Construction and O&M noise, fumes, and haze could also have temporary auditory, olfactory, and visual effects on historic settings. However, LCRA TSC would analyze and coordinate with the Service and the State Historic Preservation Office to ensure compliance with the NHPA (see LCRA TSC HCP Appendix A).

4.4.4.2 ALTERNATIVE B – REDUCED PERMIT DURATION

Alternative B would result in the same types of direct and indirect impacts to cultural resources and historic properties as described for Alternative A. However, under the reduced permit duration, impacts would only occur within a 15-year ITP. After the 15-year ITP expired, LCRA TSC would seek additional take authorization from the Service, as needed, on a project-by-project basis, and comply with NHPA on a project-by-project basis.

4.4.4.3 ALTERNATIVE C – NO ACTION

Because LCRA TSC would still perform the same activities described in Alternative A, Alternative C would likely result in the same types of direct and indirect impacts to cultural resources and historic properties as described for Alternative A. However, under Alternative C, NHPA compliance for ITP or incidental take authorization would occur on a project-by-project basis, rather than programmatically.

4.4.4.4 CUMULATIVE IMPACTS

The previously noted demographic and developmental trends in the state of Texas over the next 30 years (see previous Sections 4.4.1 to 4.4.3), and the consequent need for infrastructure are the primary factors in cumulative impacts to cultural resources and historic properties. Additional energy development (i.e., oil and gas, pipelines, renewables, transmission), residential development, urban expansion, and road maintenance and construction activity over the next 30 years would convert currently undeveloped open space containing historic properties to developed land uses and result in viewshed modifications. Likewise, incremental and cumulative affects to landscapes and other settings through landscape modification (e.g. vegetation removal/changes and aboveground structures) contribute to the NRHP eligibility of historic properties or increase risk of increased human access to cultural resources. All alternative scenarios, including the No Action Alternative, will have these ongoing trends.

Landscape modification associated with Covered Activities could result in additional direct or indirect impacts to Plan Area cultural resources over the 30-year ITP. However, these actions will likely occur irrespective of the authorization of incidental take of Covered Species or the implementation of the LCRA TSC HCP. Therefore, implementation of the proposed LCRA TSC HCP and ITP would not measurably affect cultural resources when considered in conjunction with other past, present, and reasonably foreseeable projects. Implementation of the minimization and mitigation measures described in the Proposed Federal Action (Alternative A) or the Reduced Permit Duration (Alternative B), as well as the approach to NHPA compliance provided in Section 1.3.2 of this EIS and Appendix A of the LCRA TSC HCP, would reduce LCRA TSC's contribution to cumulative effects by ensuring that 1) Covered Species habitat lost or otherwise impacted over the next 15 to 30 years would be minimized and mitigated to the maximum extent practicable, and 2) that impacts to cultural resources are considered and addressed, pursuant to Section 106 of the NHPA. Therefore, effects would be negligibly beneficial to the protection of cultural resources in the long-term.

4.4.5 Federally Listed Plant Species

4.4.5.1 ALTERNATIVE A – ISSUANCE OF SECTION 10(A)(1)(B) PERMIT

Covered Activities could result in impacts to federally listed plants within the Plan Area.

Terrestrial federally listed plants are susceptible to the same types of vegetation impacts that affect all plant species, including direct damage or destruction resulting from human workers stepping on individual plants, trampling by machinery, uprooting during vegetation clearing or other ground-disturbing activities, or other direct contact by people, equipment, materials, or construction debris. Activities that modify soil can also affect plant species through soil contamination, compaction, replacement with alternative material less conducive to supporting plant growth, and incidental introduction of competitor plant species (Tilman and Lehman. 2001; Ansley et al. 2012). Any activities that affect local topography could also affect the amount of light reaching plants, modify rainwater runoff to increase erosion, contribute to localized flooding, or displaced water. Construction activities could introduce new predatory wildlife species into an area where the plants are located, or reduce dispersion causing genetic isolation, which would directly impact individual plants (Croteau 2010). These impacts would have a more detrimental effect to federally listed plant species with severely limited ranges and/or population numbers that also suffer from other threats such as climate change or reduced reproductive capabilities (Tilman and Lehman 2001; Bartholomeus et al. 2011). Covered Activities would impact up to a conservatively estimated 14,159 acres of surface terrestrial habitat, (<0.01 percent of the Plan Area) that could potentially support federally listed plant species. However, LCRA TSC would implement the following minimization measures specifically targeted to reduce impacts to the 16 federally listed plants that could occur within the Plan Area and overlap with Covered Activities (see Chapter 6.4.1 in the LCRA TSC HCP for details):

- request from the Service and the TPWD Texas Natural Diversity Database information on previously documented locations of federally listed plants and plants proposed for Federal listing in the Plan Area prior to enrolling Covered Activities in the HCP;
- to the extent practicable, avoid subsurface disturbances within 50 feet of any previously documented locality of such plant species, limited to those localities where continued occupancy by the plant species is likely (i.e. the site retains potentially suitable habitat for the listed plant); and
- to the extent practicable, avoid surface disturbances by avoiding performing Covered Activities (and, on a voluntary basis, other Covered Activities that are not Covered Activities) within 50 feet of previously documented populations of the below species, as well as implementing the following species-specific measures when avoidance is not practicable.
 - Black lace cactus (*Echinocereus reichenbachii* var *albertii*)— Minimization measures could include raising mowing heights to no less than 8 inches or deferring disturbances until outside of the seasonal blooming period for this species (i.e., avoid the period between April and June), and minimizing subsurface disturbances near waterways.
 - Large-fruited sand verbena (*Abronia macrocarpa*)— Minimization measures could include deferring disturbances until outside of the seasonal blooming period for this species (i.e., avoid the period between February and mid-June).

- Navasota ladies'-tresses (*Spiranthes parksii*)— Minimization measures could include raising mowing heights to no less than 12 inches or deferring disturbances until outside of the seasonal blooming and seed-set period for this species (i.e., avoid the period between October and December).
- Neches River rose-mallow (*Hibiscus dasycalyx*)— Minimization measures could include deferring disturbances until outside of the seasonal blooming period for this species (i.e., avoid the period between June and August) and minimizing subsurface Disturbances near waterways and wetlands.
- Slender rushpea (*Hoffmannseggia tenella*)— Minimization measures could include raising mowing heights to no less than 8 inches or deferring disturbances until outside of the seasonal blooming period for this species (i.e., avoid the period between April and November).
- South Texas ambrosia (*Ambrosia cheiranthifolia*)— Minimization measures could include deferring disturbances until outside of the seasonal blooming period for this species (i.e., avoid the period between July and November).
- Star cactus (*Astrophytum asterias*)— Minimization measures could include raising mowing heights to no less than 5 inches.
- Texas golden gladebush (*Leavenworthia texana*)—Minimization measures could include avoiding the use of herbicides.
- Texas poppy-mallow (*Callirhoe scabriuscula*)— Minimization measures could include deferring disturbances until outside of the seasonal blooming and seed-set period for this species (i.e., avoid the period between April and June).
- Texas trailing phlox (*Phlox nivalis* spp. *texensis*)— Minimization measures could include raising mowing heights to no less than 12 inches.
- Tobusch fishhook cactus (*Sclerocactus brevihamatus* spp. *tobuschii*)— Minimization measures could include raising mowing heights to no less than 5 inches.
- Walker's manioc (*Manihot walkerae*)— Minimization measures could include deferring disturbances until outside of the seasonal blooming period of this species (i.e., avoid the period between April and September).
- White bladderpod (*Physaria pallida*)— Minimization measures could include deferring disturbances until outside of the seasonal blooming period of this species (i.e., avoid the period between April and Could).

If such measures are not practicable, LCRA TSC would provide notice and engage with the Service in advance of enrolling the Covered Activity to identify what other minimization measures, if any, may be reasonable and prudent to avoid the likelihood of jeopardizing the continued existence of the federally listed or proposed for listing plant species. Examples of additional measures could include performing surveys to map the locations of individual plants, salvage collection of individual plants from the ROW and relocation to a Service-approved site or repository, or avoidance of surface disturbances during the plant's flowering season. It is also possible that some species of plants could benefit from some Covered Activities. For example, the Texas trailing phlox prefers open canopy of at least 25–75 percent (Poole et al. 2007) and could potentially benefit from control of canopy growth that would result from maintenance of ROWs.

Given the limited extent of Covered Activities, coupled with LCRA TSC's targeted minimization measures, any adverse impacts to these species would likely be short- to long-term, minor, and not of a magnitude that would threaten the ability of these species to survive in the wild.

4.4.5.2 ALTERNATIVE B – REDUCED PERMIT DURATION

Alternative B would result in the same types of direct and indirect impacts to aquatic and terrestrial federally listed plant species as described for Alternative A. However, under this scenario, impacts would only occur within a 15-year ITP. Therefore, this EIS conservatively estimates that up to 7,080 acres of surface disturbance could occur from grading, excavation, or other activities over a 15-year period due to Covered Activities.

Alternative B would also implement the same types of minimization and mitigation measures as Alternative A. After the 15-year ITP expired, LCRA TSC would seek additional authorization from the Service on a project-by-project basis to ensure compliance with the Act for facilities upgrades and maintenance tasks. During each permit application process, the Service would evaluate the Covered Activities, Covered Species, and the proposed Conservation Program and determine whether avoidance, minimization, and mitigation measures are to the maximum extent practicable.

Given the limited extent of Covered Activities, coupled with LCRA TSC's targeted minimization measures, any adverse impacts to these species would likely be minor.

4.4.5.3 ALTERNATIVE C – NO ACTION

Alternative C would result in the same types of direct and indirect impacts to federally listed plants as described for Alternative A. However, under the No Action Alternative, LCRA TSC would not provide minimization measures through implementation of the LCRA TSC HCP. If they sought an individual ITP or section 7 consultation under this alternative, then LCRA TSC would be required to provide project-specific minimization and/or mitigation measures to offset incidental take. Because any minimization and mitigation measures would be at a smaller, project-specific scale (versus the programmatic ITP), this EIS anticipates that listed plants would experience a reduced indirect benefit, as compared to the Proposed Federal Action.

4.4.5.4 CUMULATIVE IMPACTS

Implementation of the Covered Activities could result in direct or indirect impacts to federally listed plants within the Plan Area over the 30-year term of the ITP. However, because the LCRA TSC HCP and ITP would not measurably affect federally listed plants when considered in conjunction with other past, present, and reasonably foreseeable projects in the Plan Area, these impacts are anticipated to occur under any of the alternatives, including the No Action Alternative. Other potential reasonably foreseeable trends in the Plan Area include additional energy development (oil and gas, pipelines, renewables, transmission), residential development, and road maintenance and construction activity, as well as ongoing agriculture (see Table 13). While not quantified, the expectation is that these activities will result in further elimination or replacement of federally listed plant species. Likewise, future actions could damage or destroy some individuals due to human disturbance, trampling by vehicles, or aboveground infrastructure. Anticipated land development over the next 30 years would convert currently

undeveloped open space possibly used by federally listed plants to developed land uses. As previously described, these changes are more likely around rapidly growing urban centers, including Houston, Dallas-Fort Worth, Austin, and San Antonio.

Covered Activities could result in additional surface disturbance of up to 14,159 acres of land, which may contain federally listed plant species. However, implementation of the minimization measures described in the Proposed Federal Action (Alternative A) or the Reduced Permit Duration (Alternative B) would reduce LCRA TSC's contribution to cumulative effects by minimizing impacts to federally listed plant species. Furthermore, the minimization and mitigation provided under the LCRA TSC HCP likely would result in potential for management of existing conservation lands and protection of larger, contiguous tracts of land with greater conservation value than would be achieved if protections occurred on a project-by-project basis. In some cases, this could result in new or improved protections for populations of federally listed plant species. Therefore, cumulative impacts to federally listed plant species could be long-term, but overall minor.

4.4.6 Non-Federally Listed Species

4.4.6.1 ALTERNATIVE A – ISSUANCE OF SECTION 10(A)(1)(B) PERMIT

General Wildlife

Over a 30-year period up to a conservatively estimated maximum of 14,159 acres (<0.01 percent of the Plan Area) of previously undisturbed terrestrial wildlife habitat capable of supporting wildlife could be removed or converted to other vegetation types from Covered Activities. Impacts to habitats could include: replacing native vegetation with man-made structures; decreasing the amount of contiguous habitat (e.g., fragmentation); increased vegetation disturbance, erosion, and soil compaction; and the introduction of non-native species (e.g., Whitney and Adams 1980; Mills et al. 1989).

Both short-term effects, resulting from physical disturbance during construction activities, and long-term effects, resulting from habitat modification and fragmentation, impact general wildlife. Increased noise and activity levels during construction could potentially disturb breeding or other activities of species near Covered Activities. Displacement could potentially force individuals into competition with residents of adjacent habitat for available resources. This displacement could produce short-term changes in localized species composition (Adams and Geis 1981) or lead to reduced physical condition and health of affected individuals.

Covered Activities would predominately impact grassland and prairie vegetation, shrubland, and forested/woodland vegetation types, which account for roughly 41 percent, 24 percent, and 14 percent, respectively, of the Plan Area's total vegetated land cover. General wildlife near Covered Activities could experience a slight loss of cover, nesting, or forage material during construction; however, the prevalence of similar habitats in adjacent areas and regrowth of some vegetation in the ROWs following construction would minimize the effects of this loss. Some wildlife species (such as deer [*Odocoileus* spp.], coyote [*Canis latrans*], red-tailed hawk [*Buteo jamaicensis*], and prairie dog [*Cynomys ludovicianus*]) could benefit from habitat disturbance and alterations, whereas other species (such as ocelot, nine-banded armadillo [*Dasypus novemcinctus*], or bobcat [*Lynx rufus*]) could decrease in localized areas as habitats are disturbed or converted from natural landscapes (e.g., Markovchick-Nicholls 2007; Di Bitetti et al. 2008).

The amount of grassland and shrubland lost or fragmented due to Covered Activities would depend on the nature and location of specific Covered Activities. However, this EIS estimates that up to 4,211 acres of previously undisturbed grassland/shrub habitat in the Plan Area could be affected (0.01 percent of total grassland/shrub habitat present within the Plan Area). Once activities are complete and herbaceous vegetation has recovered, the expectation is that grassland and shrub/scrub-dependent wildlife species would re-populate ROWs and other temporary construction areas.

The amount of forested or woodland areas lost or fragmented due to Covered Activities would depend on the nature and location of specific Covered Activities. However, this EIS estimates that up to 9,948 acres of previously undisturbed woodland habitat in the Plan Area could be affected (0.07 percent of total woodland/forested habitat present within the Plan Area). Forest habitat fragmentation can have a detrimental effect on avian species with a marked preference for large, undisturbed forested tracts through increased predation, brood-parasitism, and other impacts on nesting success (Robbins et al. 1989; Faaborg et al. 1992; Terborgh 1989). In contrast, long-term conversion of woodlands to open grass/shrublands within ROWs would create edge habitat, which could improve the cover or forage habitat for some edge species, such as the eastern cottontail (*Sylvilagus floridanus*) or white-tailed deer (*Odocoileus virginianus*) (Adams and Geis 1983).

Covered Activities could also alter predator interactions near the activities, such as through the installation of man-made structures that provide perches for predators or through habitat modifications that reduce cover for prey species (Friesen et al. 1995; Wilcove 1985; Engels and Sexton 1994; Jokimaki and Huhta 2000).

Heavy machinery or vehicle activity during construction activities could kill some small, low-mobility or underground species such as some amphibians, reptiles, and small mammals whereas more-mobile species would typically move out of the area to avoid harm (Ashley and Robinson 1996). Confining the use of vehicles and machinery to ROWs that are accessed and traversed by way of gravel roads or unpaved vehicle trails with low travel speeds could minimize collision-related death or wounding general wildlife species. Larger, more-mobile terrestrial species such as birds, deer, foxes, and squirrels would likely be able to avoid such direct collision impacts (Rytwinski and Fahrig 2015; Elwell and Cox 1950).

The clearing of vegetation at the width needed to conduct the Covered Activities (i.e., generally less than 150 feet for linear ROWs) could be a barrier to movement for low mobility or smaller species but would not be expected to create a barrier to movement for highly mobile species such as larger mammals or birds (Fahrig and Rytwinski 2009; Rogers et al. 2004).

O&M activities would predominantly consist of inspections, vegetation trimming/pruning, and mowing, which would maintain herbaceous habitats. Similar to new construction, the expectation is that more-mobile species would move out of the area during O&M activities to avoid harm, whereas less-mobile species would be more susceptible to harm or mortality from maintenance activities. In general, O&M activities would be of short duration, and unlikely to result in changes to wildlife species composition and community dynamics.

Indirect wildlife habitat impacts on previously undisturbed wildlife habitat from pollutants such as oil and grease originating from machinery and construction-related activities; fugitive dust; infestation of the red imported fire ant; proliferation of exotic plant species, and sedimentation could all occur during Covered Activities (Cox 2013). However, implementation of spill prevention and control methods, proper inspection and maintenance of equipment, and proper runoff and erosion control measures identified in the SWPPP will minimize these impacts. LCRA TSC would restore disturbed areas following construction to reduce potential erosion impacts and to promote recovery from project disturbances (see Section 2.1.8.1).

Under the Proposed Federal Action, LCRA TSC would also provide minimization and mitigation measures for incidental take of Covered Species through the potential creation, protection, or maintenance/improvement of suitable habitat. Therefore, although the intent of the proposed mitigation is to protect Covered Species, general wildlife habitat would experience indirect benefits associated with the minimization and mitigation measures. The Service similarly determined for the Southern Edwards Plateau (SEP) HCP (Service 2015) that proposed conservation measures would “result in a greater level of land preservation over the No Action Alternative ... [which would] support the sheltering, breeding, and foraging requirements for many other Voluntarily Conserved and wildlife species.”

In cases where practicable opportunities for on-the-ground conservation actions may not currently exist, or minimization and mitigation measures are unidentified, LCRA TSC would work with the Service to identify alternative measures to support recovery actions for Covered Species (and associated biotic resources). Based on above considerations, direct and indirect impacts to wildlife habitat would be localized, short-term, and minor.

Migratory Birds

TPW Code Section 64.002, regarding protection of nongame birds, provides that no person may catch, kill, injure, pursue, or possess a bird that is not a game bird. TPW Code Section 64.003, regarding destroying nests or eggs, provides that, no person may destroy or take the nests, eggs, or young and any wild game bird, wild bird, or wild fowl.

Birds protected by the MBTA occur in every habitat type in the United States, and nests occur in trees and on forest floors, in grassland or shrubland, uplands and wetlands. Covered Activities have the potential to destroy active nests and eggs, kill individual birds, and modify habitat used by migratory birds for breeding, feeding, and sheltering. Adult birds capable of flight are likely to avoid most construction, maintenance, operations, and decommissioning activities. However, adult birds could collide with transmission lines and may be vulnerable to electrocution. LCRA TSC would follow procedures for avian protection as outlined by the Avian Power Line Interaction Committee (APLIC) (APLIC and Service 2005; APLIC 2006, 2012), as feasible, to minimize collision and electrocution risks.

Destruction of eggs and the killing of young birds not yet able to fly could occur during activities that modify nest sites. However, LCRA TSC will comply with applicable federal, state, and local avian laws pertaining to its activities, including the MBTA. In addition, the minimization and mitigation measures required under the LCRA TSC HCP will benefit avian species—

including unlisted migratory and state non-game bird species—in ways similar to Covered Species under the LCRA TSC HCP. Therefore, impacts to migratory bird individuals or nests would be minor.

Golden Eagles

Human activity contributes significantly to golden eagle mortality, with more than 70 percent of recorded golden eagle deaths attributed directly or indirectly to human activity (Kochert et al. 2002). Collision with power lines or other structures, as well as electrocution, are documented sources of mortality for golden eagles (Kochert et al. 2002). However, golden eagles are rare and locally uncommon residents in the western part of the state; therefore, their potential for exposure to Covered Activities would be low. Implementation of APLIC guidance that addresses avian interactions with power lines would further minimize risk to eagles. Therefore, impacts to golden eagles would be minor, but long-term. Note that a discussion of impacts to bald eagles is in the state-listed species section.

State-listed Species

A summary of potential direct and indirect effects specific to state-listed species is in Table 15. Impacts associated with general wildlife would also apply to these species. Impacts for any one species would not exceed total incidental take associated with surface terrestrial Covered Species, e.g., 14,159 acres (<0.01 percent of the Plan Area vegetation cover). In many cases, species impacts would be significantly lower, as impacts would only occur on lands where Covered Species and state-listed species distribution overlap.

Under the Proposed Federal Action, LCRA TSC would provide minimization and mitigation for incidental take of Covered Species through the potential creation, protection, or maintenance/improvement of suitable habitat. Therefore, although the intent of the proposed mitigation is to protect Covered Species, sensitive species with habitat protected by these conservation measures could also experience an indirect benefit. In cases where practicable opportunities for on-the-ground conservation actions may not currently exist, or minimization and mitigation measures are unidentified, LCRA TSC would work with the Service to identify alternative measures to support recovery actions for Covered Species (and associated biotic resources). Therefore, impacts to state-listed species would be localized, short-term, and minor.

Table 15. Summary of State-Listed Species Impacts

Species	Potential Direct and Indirect Impacts
BIRDS	
Bachman's sparrow (<i>Peucaea aestivalis</i>) Cactus ferruginous pygmy-owl (<i>Glaucidium brasilianum cactorum</i>) Tropical parula (<i>Setophaga pititayumi</i>) Black-capped vireo (<i>Vireo atricapilla</i>) Zone-tailed hawk (<i>Buteo albonotatus</i>) Bald eagle (<i>Haliaeetus leucocephalus</i>)	<ul style="list-style-type: none"> Covered Activities involving clearing of habitat or right-of-way (ROW) maintenance could reduce or degrade the amount of habitat available for use by the species (Service 2015). The Bachman's sparrow, often found in utility ROWs, may actually benefit from ROW clearing, as it prefers open grassy conditions (Dunning et. al 2017). Collision with/electrocution by transmission lines could occur during the conduct of Covered Activities. Collision is also possible if an occupied nest is destroyed by equipment and machinery used during Covered Activities. Covered Activities that modify vegetation within ROWs are unlikely to change insect communities in ways that substantially alter the prey base, though studies have shown negative effects from habitat fragmentation on generalist insect species and reliant predator species (Stoner and Joern 2004). Changes to potential predator populations could be possible if ROWs cross large patches of dense and previously unfragmented woodland resulting in habitat fragmentation (Stoner and Joern 2004).
White-faced ibis (<i>Plegadis chihi</i>)	<ul style="list-style-type: none"> The expectation is that Covered Activities will not significantly change the character of the open marsh habitats used by the white-faced ibis. Noise and activity disturbances from the conduct of Covered Activities during the wintering season could disturb individuals and/or temporarily displace them from preferred feeding or resting sites. White-faced ibis could collide with fences and power lines, although no studies have confirmed this threat. Collision is possible if an occupied nest is destroyed by equipment and machinery used during Covered Activities.
Texas Botteri's sparrow (<i>Aimophila botterii texana</i>) White-tailed hawk (<i>Geranoaetus (syn. Buteo) albicaudatus</i>)	<ul style="list-style-type: none"> Temporary habitat removal or degradation could occur during Covered Activities; however, Texas Botteri's sparrow are found in a variety of grassland types, indicating the species can establish nests in various successional habitat stages (Miller et al. 2013). Performing Covered Activities could result in noise and activity disturbances and displace species and/or cause nest abandonment if performed in or adjacent to nesting sites during the breeding season. Species could collide with fences and power lines, although no studies have confirmed this threat. Collision is possible if an occupied nest is destroyed by equipment and machinery used during Covered Activities. The expectation is that populations of insect prey will not significantly change in these locations. However, new facilities within undisturbed habitat could increase perches for predatory raptors.
MAMMALS	
Rafinesque's big-eared bat (<i>Corynorhinus rafinesquii</i>) Southern yellow bat (<i>Lasiurus ega</i>)	<ul style="list-style-type: none"> Habitat removal or degradation could occur during Covered Activities involving vegetation clearing related to construction or ROW maintenance. Primary threat to Rafinesque's big-eared bat include degradation and loss of foraging habitats and declines in the availability and suitability of tree and human-made structures for roosting. Removal of dead fronds from planted palm trees reduces roosting habitat of southern yellow bat and could cause incidental mortality of young. Noise and activity disturbances could displace or disturb Rafinesque's big-eared bat; this species is very intolerant of disturbance and could abandon roost sites or hibernation sites if subjected to disturbance (Trousdale et al. 2008). Covered Activities would not significantly alter insect communities.
REPTILES	
Black-striped snake (<i>Coniophanes imperialis</i>) Chihuahuan Desert lyre snake (<i>Trimorphodon wilkinsonii</i>) Timber rattlesnake (<i>Crotalus horridus</i>) Reticulate collared lizard (<i>Crotaphytus reticulatus</i>)	<ul style="list-style-type: none"> Covered Activities could alter or destroy habitat used by species during vegetation clearing, maintenance, excavation, or construction of access roads or footings. Black-striped snakes tolerate moderate habitat alteration but not conversion to intensive agriculture (Ariano-Sanchez 2013). Reticulate collared lizard are threatened by habitat alteration and conversion of native grazing lands to farms and improved pastures and planting of exotic mat-forming grasses. (Hammerson et al. 2007). Brush clearing and root-plowing can crush or bury Texas tortoise, resulting in death (Rose and Judd 2014). The daytime activity of equipment and machinery could physically kill or wound individuals. Vehicle incidents are a significant cause of mortality for Texas tortoise (Judd and Rose 2000).

Species	Potential Direct and Indirect Impacts
Texas indigo snake (<i>Drymarchon melanurus erebennus</i>)	<ul style="list-style-type: none">Intentional or accidental injury or killing of snakes by humans is also a potential direct impact.The application of herbicides could pose a limited risk to species if such materials contact individuals. However, the likelihood of this effect is very low due to the density of individuals on the landscape and the rarity of such application releases. Insecticides can be detrimental to Texas horned lizard by directly causing illness or death or indirectly be severely reducing or eliminating harvester ants (<i>Pogonomyrmex barbatus</i>) (Hessong 2017)
Texas scarlet snake (<i>Cemophora coccinea lineri</i>)	
Texas tortoise (<i>Gopherus berlandieri</i>)	
Texas horned lizard (<i>Phrynosoma cornutum</i>)	
AMPHIBIANS	
White-lipped frog (<i>Leptodactylus fragilis</i>)	<ul style="list-style-type: none">Species extirpation in Texas was likely caused by insecticides, which can be detrimental to white-lipped frogs by directly causing illness or death (Heyer et al. 2010; NatureServe 2018).Burrows encountered during ground disturbance activities could wound or kill individual species (Heyer et al. 2010; Herps of Texas 2018). Both species spend time underground, often in disturbed soils, but the sheep frog spends a majority of its time underground. Sheep frog individuals are more likely to be affected by construction activities since they are more common in Texas, though both species are considered rare in Texas (Heyer et al. 2010; NatureServe 2018)Construction activities could destroy the secretion foam created by male white-lipped frogs to hold eggs and larvae, resulting in loss of the brood (Heyer et al. 2010). Though possible, some researchers believe this species may be extirpated in Texas, so the likelihood of the Covered Activities impacting individuals is highly unlikely given their rarity across the landscape.
Sheep frog (<i>Hypopachus variolosus</i>)	

4.4.6.2 ALTERNATIVE B – REDUCED PERMIT DURATION

Alternative B would result in the same types of direct and indirect impacts to wildlife habitat and species as described for Alternative A. However, under this scenario, impacts would only occur within a 15-year ITP. Therefore, this EIS conservatively estimates that up to 7,080 acres of terrestrial wildlife habitat could be removed or converted to other vegetation types from grading, excavation, or other activities over a 15-year period due to Covered Activities. Covered Activities could also result in long-term conversion of 0.04 percent of forested/woodland vegetation to open grass/shrublands within ROWs, which could have beneficial or adverse effects depending on the wildlife species. O&M activities would typically maintain habitat composition, abundance, or diversity within the Plan Area. Therefore, impacts to wildlife habitat and species would be localized, short-term, and minor.

Alternative B would also implement the same types of minimization and mitigation measures as Alternative A. Potential indirect benefits associated with Covered Species mitigation would be as described for the Proposed Federal Action, but mitigation would be only half of that proposed under Alternative A due to reduced authorized incidental take. After the 15-year ITP expired, LCRA TSC would seek additional authorization from the Service on a project-by-project basis to ensure compliance with the Act for facilities upgrades and maintenance tasks. During each permit application process, the Service would evaluate the Covered Activities, Covered Species, and the proposed Conservation Program and determine whether avoidance, minimization, and mitigation measures are to the maximum extent practicable.

4.4.6.3 ALTERNATIVE C – NO ACTION

Alternative C would result in the same types of direct and indirect impacts to wildlife species and habitat as described for Alternative A. However, under the No Action Alternative, LCRA TSC would not provide minimization or mitigation for incidental take of Covered Species habitat through implementation of the LCRA TSC HCP. If LCRA TSC seeks an individual ITP or section 7 consultation under this alternative, then they would be required to provide project-specific minimization and/or mitigation measures to offset incidental take. Therefore, impacts to wildlife habitat and species would be localized, short-term, and minor. Because any minimization and mitigation measures would be at a smaller, project-specific scale (versus the programmatic ITP), this EIS anticipates that general wildlife would experience a reduced indirect benefit, as compared to the Proposed Federal Action.

4.4.6.4 CUMULATIVE IMPACTS

Past and present actions in the Plan Area, such as urban development and agricultural activities, have contributed to the direct loss or modification of wildlife habitat as well as potential for injury, mortality, habitat fragmentation, avoidance, and displacement of general and state-listed wildlife species. Other potential reasonably foreseeable trends in the Plan Area include additional energy development (oil and gas, pipelines, renewables, transmission), residential development, and road maintenance and construction activity, as well as ongoing agriculture (see Table 13). While unquantified, the expectation is that these activities will result in further elimination or replacement of suitable habitat with impervious cover or nonnative vegetation. Future actions may harm or kill some individuals due to collision with vehicles or aboveground infrastructure, while other species may benefit from creation of new habitat.

As described in Section 3.8, the expected population in Texas will continue to grow and Texas will need to invest in new infrastructure to accommodate that growth (Section 4.4.2.4). Texas includes 142 million acres of privately-owned farmland, rangeland, and forest accounting for 83 percent of the state's land base. Despite increased population growth, the Texas Land Trends (2014) reports that land use for wildlife management along the I-35 corridor increased 5,837 percent (from 3,095 to 183,757 acres) and 3,609 percent (from 28,262 to 1,048,279 acres) in the Texas Hill Country region between 1997 and 2012. Statewide, wildlife managed lands increased 3,500 percent (from 91,852 to 3,306,557 acres). This is likely attributable, at least in part, to existing HCPs and the creation of protected greenspaces within these areas. Texas Land Trends (2014) reports that collective working lands (including grazing land, cropland, timber production, etc.) have only decreased one percent since 1997, indicating that the increase in wildlife management has off-set much of the land conversion away from agricultural uses in the state.

LCRA TSC activities would add to these cumulative impacts through a conservatively estimated maximum of 14,159 acres of surface disturbance to previously undisturbed habitat over a 15- to 30-year period. These effects would occur under all alternatives, including the No Action Alternative. Therefore, Covered Activities would result in a minor change in total potential habitat for wildlife species (see Table 15). However, implementation of the minimization (Section 2.1.8.1) and mitigation (Section 2.1.8.2) measures described in the Proposed Federal Action (Alternative A) or the Reduced Permit Duration (Alternative B) would reduce LCRA TSC's contribution to cumulative wildlife species and habitat effects by ensuring that Covered Species habitat loss over the next 30 years would be minimized and mitigated to the maximum extent practicable. Furthermore, the minimization and mitigation provided under the LCRA TSC HCP likely would result in potential for management of existing conservation lands and protection of larger, contiguous tracts of land with greater conservation value than would be achieved on a project-by-project basis. Therefore, cumulative impacts to wildlife species and habitat would be long-term, but minor.

4.4.7 Socioeconomics and Environmental Justice

4.4.7.1 ALTERNATIVE A – ISSUANCE OF SECTION 10(A)(1)(B) PERMIT

Under the Proposed Federal Action, LCRA TSC would receive an ITP and implement its LCRA TSC HCP over a 30-year period. Infrastructure development associated with Covered Activities could potentially contribute to the overall Plan Area economy by generating short-term employment, income, or spending during construction. However, specific projects are unidentified at this time, so we are unavailable to quantify their specific economic impact.

Implementation of Covered Activities would provide negligible, long-term socioeconomic benefits to the Plan Area based on the continued provision of an adequate and reliable level of power. Economic growth and development rely heavily on adequate public utilities. Without this basic infrastructure, a community's potential for economic growth would be constrained. Infrastructure development also has potential to influence land use patterns, such as through changes in population density or growth rates. However, the expectation for ongoing provision of utility service will result in induced growth in most cases, since population growth induces expansion, thus the need for more reliable electric services (ERCOT 2016).

Depending on the location of Covered Activities, impacts to minority or low-income populations are possible. However, precise identification and discussion regarding the nature, magnitude, or location of what impacts, how much, and where those impacts would occur is not possible due to the programmatic nature of the LCRA TSC HCP. The lack of known projects precludes detailed analysis of potential disproportionately high and adverse human health or environmental effects to environmental justice populations.

The Proposed Federal Action assumes LCRA TSC would provide minimization and mitigation for incidental take of Covered Species habitat through the potential creation, protection, or improvement of suitable habitat. Studies have suggested that the conservation of open space could have the effect of increasing property values of the surrounding land (McConnell and Walls 2005). However, these benefits are uncertain, as they depend on the size, location, and shape of the preserved lands (Jiang and Swallow 2007).

4.4.7.2 ALTERNATIVE B – REDUCED PERMIT DURATION

Alternative B would result in the same types of direct and indirect socioeconomic and environmental justice impacts as described for the Proposed Federal Action. However, under this scenario, impacts would occur within a reduced timeframe, as LCRA TSC implements their HCP over a 15-year period rather than a 30-year period.

Alternative B would also implement the same types of minimization (Section 2.1.8.1) and mitigation (Section 2.1.8.2) measures as Alternative A; however, mitigation would be only half the amount of Alternative A due to lower authorized incidental take. Therefore, impacts to socioeconomics would be long-term and negligible. After the 15-year ITP expired, LCRA TSC would seek additional authorization from the Service on a project-by-project basis to ensure compliance with the Act for facilities upgrades and maintenance tasks. During each permit application process, the Service would evaluate the Covered Activities and Covered Species, as well as proposed Conservation Program to determine what impacts there would be to socioeconomics and environmental justice.

4.4.7.3 ALTERNATIVE C – NO ACTION

Alternative C would result in the same types of direct and indirect impacts as described for Alternative A. Therefore, impacts to socioeconomics would be long-term and negligible.

4.4.7.4 CUMULATIVE IMPACTS

As described in Section 4.4.2.4, the expected population in Texas will continue to grow between 2020 and 2070, from 29.5 million to 51 million. According to the Texas Farm Bureau (2018), while the statewide value of an acre of rural land varies greatly by region, land values as a whole in Texas have risen since 2010, for example by 5 percent in 2016. Increased land costs have correlated impacts on increasing housing prices, accounting for approximately 20.4 percent of total home cost in 2016 for Texas (compared to 14.1 percent of total home cost in 2000) (Texas A&M University 2018). This anticipated past and future development and urbanization in the Plan Area, as indicated by previous and projected population increases, will occur irrespective of the implementation of the LCRA TSC HCP. Therefore, implementation of the LCRA TSC HCP and ITP would not measurably affect employment, income, or tax base when considered in conjunction with other reasonably foreseeable projects.

Implementation of the Proposed Federal Action (Alternative A) or the Reduced Permit Duration (Alternative B) would reduce LCRA TSC's risk of violating the Act and help reduce costs or time delays associated with the need for additional permits. This regulatory assurance would improve LCRA TSC's ability to provide efficient, safe, cost-effective, and reliable services to its customers in a rapidly growing region, thereby promoting opportunities for economic growth and providing a benefit over the No Action Alternative.

4.4.8 Vegetation

4.4.8.1 ALTERNATIVE A – ISSUANCE OF SECTION 10(A)(1)(B) PERMIT

Summarized potential direct and indirect impacts to vegetation from Covered Activities are in Table 16. The primary direct impact to vegetation would be the removal or modification of existing vegetation from areas required for ROWs and other facilities. The primary direct impact to vegetation associated with O&M activities would be the modification of existing vegetation associated with maintenance activities and isolated disturbance. The extent of vegetation removed or converted to other vegetation types is directly related to the extent of habitat that is directly or indirectly modified by the Covered Activities. The amount of potential habitat that may be impacted by Covered Activities is related to the incidental take of Covered Species following the Service's use of surrogates rule (Federal Register 80:26832) as described in the LCRA TSC HCP.

Table 16. Vegetation Impacts within Plan Area

Category	Activity	Direct Impacts to Vegetation	Indirect Impacts
New Construction, Upgrading, and Decommissioning	Access road/structure construction or improvement; erosion and sedimentation control installation; vegetation clearing; surface grading, trenching, and boring	Vegetation removal or modification, fragmentation, or conversion to other vegetation types	Temporary dust deposition; temporary vegetation trampling from vehicles, equipment, and human activity; or the introduction of new, invasive, or exotic species
O&M	Maintaining ROW; access road maintenance; excavation for isolated portions of underground lines; isolated surface disturbance for aboveground facilities	Tree/vegetation trimming or mowing	Same as above

* Includes emergency actions

Therefore, over a 30-year period, Covered Activities could remove or convert up to 14,159 acres (0.01 percent of the Plan Area vegetation cover) of previously undisturbed vegetation. Surface disturbance would predominately impact grassland and prairie vegetation, shrubland, and forested/woodland vegetation types that support Covered Species.

Construction of permanent structures, e.g., access roads or facilities, would result in long-term vegetation removal for the duration of the structure's lifespan. Long-term conversion of up to an estimated 9,948 acres of previously undisturbed woodland to open grass/shrubland would also occur in ROWs, if tree or large shrub removal were required. This represents roughly 0.07 percent of total woodland/forested habitat present within the Plan Area. Disturbance estimates of up to 4,211 acres of grassland and shrubland could occur from Covered Activities. This represents roughly 0.01 percent of total grassland and shrubland within the Plan Area. Once construction is completed, herbaceous species would recolonize within ROWs, but trees will not

be permitted to grow within ROWs for the duration of most linear projects' lifespans. LCRA TSC would restore disturbed areas following construction to reduce potential erosion impacts and to promote recovery from project disturbances.

O&M impacts would be predominately limited to inspections, vegetation trimming/pruning, and mowing within previously disturbed areas. These actions would typically limit reestablishment of woody species and maintain existing vegetation community composition, abundance, or diversity. Potential impacts to previously undisturbed vegetation adjacent to construction and O&M areas could include the accumulation of fugitive dust on vegetation, thereby temporarily reducing primary production; sedimentation of downstream plant communities as a result of soil erosion; offsite pollution of adjacent plant communities as a result of runoff carrying oil and grease from heavy equipment; introduction of exotic species through equipment and human activity; and spread of oak wilt (Field et al. 2010; Kuvlesky 2013; Caplenor 1964). However, LCRA TSC would minimize these impacts through use of measures such as:

- Use of E&S controls as required by TCEQ or local ordinances to address stormwater discharges during construction.
- Revegetation and restoration of disturbed areas to preconstruction contours with a native seed mix certified by the USDA and approved by the landowner.

Under the Proposed Federal Action, LCRA TSC would also provide mitigation for incidental take of Covered Species through the potential creation, protection, or maintenance/improvement of suitable habitat. Therefore, although the intent of the proposed mitigation is to protect Covered Species, vegetation communities associated with mitigation measures could also experience an indirect benefit. The Service made a similar finding in the SEP HCP EIS (Service 2015), that land conservation would result in vegetation benefits because a larger percentage of the native plant community would be preserved and maintained. In cases where practicable opportunities for on-the-ground conservation actions may not currently exist, or minimization and mitigation measures are unidentified, LCRA TSC would work with the Service to identify alternative measures to support recovery actions for Covered Species (and associated biotic resources). Therefore, impacts to vegetation would be minor and short- to long-term.

4.4.8.2 ALTERNATIVE B – REDUCED PERMIT DURATION

Alternative B would result in the same types of direct and indirect impacts to vegetation as described for Alternative A. However, under this scenario, impacts would only occur within a 15-year ITP. Therefore, this EIS conservatively estimates that up to 7,080 acres of vegetation could be removed from production or converted to other vegetation types from grading, excavation, or other activities over a 15-year period due to Covered Activities. Due to a shorter permit duration, Covered Activities would result in negligibly less (<0.01 percent) vegetation removal and long-term conversion of woodland/forested vegetation to open grass/shrubland in the Plan Area (0.04 percent), as compared to the Proposed Federal Action.

O&M activities would typically maintain vegetation community composition, abundance, or diversity within the Plan Area. Potential indirect benefits associated with Covered Species mitigation would be as described for the Proposed Federal Action. Therefore, impacts to vegetation would be minor. However, mitigation would only occur during the 15-year time

period so mitigation would only be half of that proposed under Alternative A due to reduced authorized incidental take.

After the 15-year ITP expired, LCRA TSC would seek additional authorization from the Service on a project-by-project basis to ensure compliance with the Act for facilities upgrades and maintenance tasks. During each permit application process, the Service would evaluate the Covered Activities and Covered Species, as well as the proposed Conservation Program to determine what impacts to vegetation would be.

4.4.8.3 ALTERNATIVE C – NO ACTION

Alternative C would result in the same types of direct and indirect impacts to vegetation as described for Alternative A. Therefore, impacts to vegetation would be minor. However, under the No Action Alternative, LCRA TSC would not provide minimization or mitigation for incidental take of Covered Species habitat through implementation of the LCRA TSC HCP. If LCRA TSC seeks an individual ITP or section 7 consultation under this alternative, then they would be required to provide project-specific minimization and/or mitigation measures to offset incidental take. Because any minimization or mitigation would be at a smaller, project-specific scale (versus the programmatic ITP), we anticipate that vegetation resources would experience a reduced indirect benefit, as compared to the Proposed Federal Action.

4.4.8.4 CUMULATIVE IMPACTS

Past and present actions have contributed to the direct loss or conversion of vegetation due to a variety of factors such as population growth and urban/suburban/extra-urban development, energy development, agricultural operations, water development, and infrastructure growth (see Table 13). Future development and urbanization, as indicated by projected population increases in the Plan Area (see Section 3.8) could result in additional replacement of native vegetation with impervious cover or nonnative vegetation, as well as fragmentation of existing vegetation communities.

As previously described in Section 4 cumulative impact sections, population growth is likely to result in increased development into the foreseeable future in Texas. Table 12 describes the affected vegetation communities present within the Plan Area that could overlap with Covered Activities. Although impacts are possible anywhere Covered Activities occur, impacts are likely to be more prevalent in areas experiencing the most rapid population growth. According to the National Public Radio's (2018) report of U.S. Census Bureau trends, seven Texas cities (Frisco, New Braunfels, Pflugerville, Georgetown, McKinney, Flower Mound, and Cedar Park) had the greatest population growth percentage between 2016 and 2017 in the United States. Meanwhile, the same study determined that San Antonio, Dallas, Fort Worth, and Frisco all fall within the top 10 U.S. cities with the greatest population growth between 2016 and 2017.

Under all alternatives, including the No Action Alternative, Covered Activities considered in this EIS would contribute up to a conservatively estimated maximum of 14,159 acres of direct disturbance to previously undisturbed Plan Area vegetation, when considered in conjunction with other past, present, and reasonably foreseeable projects. In addition, potential indirect impacts could affect previously undisturbed vegetation adjacent to construction and O&M areas. However, implementation of the minimization (Section 2.1.8.1) and mitigation (Section 2.1.8.2)

measures described in the Proposed Federal Action (Alternative A) or the Reduced Permit Duration (Alternative B) would reduce LCRA TSC's contribution to cumulative vegetation effects by ensuring that Covered Species habitat lost or otherwise impacted over the next 30 years would be minimized and mitigated to the maximum extent practicable. Furthermore, the minimization and mitigation provided under the LCRA TSC HCP would result in potential for management of existing conservation lands and protection of larger, contiguous tracts of land with greater conservation value than would be achieved if similar acreage were protected on a project-by-project basis. Therefore, cumulative impacts to vegetation would be minor.

4.5 Summary of Resources

Resource	Alternative A	Alternative B	Alternative C
Aesthetics	Covered Activities visual impacts would be short- to long-term, and minor to moderate, depending on their location.	Similar to Alternative A	Similar to Alternative A, but any minimization or mitigation measures that could reduce visual impacts would be at a smaller, project-specific scale, and could be less comprehensive compared to a programmatic ITP.
Aquatic Resources	Covered Activities impacts to surface aquatic habitat would be localized, short-term, and minor. Impacts to groundwater would be minor, but short- to long-term in duration.	Similar to Alternative A, but impacts would occur within a reduced timeframe.	Similar to Alternative A, but any minimization or mitigation measures that could reduce aquatic impacts would be at a smaller, project-specific scale, and could be less comprehensive compared to a programmatic ITP.
Covered Species	Requested take from Covered Activities would be less than 0.2 percent, and the maximum would be 0.7 percent of potential habitat within the Plan Area. Therefore, effects would be short- to long-term, and minor to moderate.	Similar to Alternative A, but maximum estimated incidental take would be reduced by half, due to reduced timeframe.	Similar to Alternative A, but any minimization or mitigation measures that could reduce Covered Species impacts would be at a smaller, project-specific scale, and could be less comprehensive compared to a programmatic ITP.
Cultural Resources	Covered Activities could result in below-ground to ground-surface disturbances, and aboveground disturbances and intrusiveness. LCRA TSC would further analyze and coordinate, once the specific locations of Covered Activities are determined to ensure compliance with the NHPA.	Similar to Alternative A, but impacts would occur within a reduced timeframe.	Similar to Alternative A, but NHPA compliance for ITP or incidental take authorization would occur on a project-by-project basis, rather than programmatically.
Federally Listed Plant Species	Covered Activities would impact up to 14,159 acres of surface terrestrial habitat that could support listed plant species. Due to minimization measures, any adverse impacts would be short- to long-term and minor.	Similar to Alternative A, but up to 7,080 acres of surface disturbance could occur over a 15-year period.	Similar to Alternative A, but any minimization or mitigation measures that could reduce federally listed plant impacts would be at a smaller, project-specific scale, and could be less comprehensive compared to a programmatic ITP.

Resource	Alternative A	Alternative B	Alternative C
Non-Federally Listed Species	Over a 30-year period, removal and conversion of up to 14,159 acres of terrestrial wildlife habitat occur from Covered Activities. Direct and indirect impacts to wildlife habitat would be localized, short-term, and minor. Impacts to migratory birds would be minor. Impacts to golden eagles would be minor, but long-term. Impacts to state-listed species would be localized, short-term, and minor.	Similar to Alternative A, but removal and conversion of up to 7,080 acres of terrestrial wildlife habitat could occur over a 15-year period.	Similar to Alternative A, but any minimization or mitigation measures that could reduce non-federally listed species impacts would be at a smaller, project-specific scale, and could be less comprehensive compared to a programmatic ITP.
Socioeconomics and Environmental Justice	Infrastructure development associated with Covered Activities could potentially contribute negligible, long-term benefits to the overall Plan Area economy. Impacts to minority or low-income populations are possible but cannot be determined at this time.	Similar to Alternative A, but impacts would occur within a reduced timeframe.	Similar to Alternative A.
Vegetation	Over a 30-year period, removal and conversion of up to 14,159 acres of previously undisturbed vegetation could occur from Covered Activities. These impacts would be minor and short- to long-term.	Similar to Alternative A, but removal and conversion of up to 7,080 acres of vegetation could occur over a 15-year period.	Similar to Alternative A, but any minimization or mitigation measures that could reduce vegetation impacts would be at a smaller, project-specific scale, and could be less comprehensive compared to a programmatic ITP.

CHAPTER 5. OTHER DISCLOSURES

5.1 Unavoidable Adverse Effects

Unavoidable Adverse Effects are effects that cannot be avoided due to constraints in alternatives. The Service does not require avoiding Unavoidable Adverse Effects, but the effects must be disclosed, discussed, and mitigated, if possible (40 CFR 1500.2[e]). Since LCRA TSC activities and other future projects are anticipated in the Plan Area over the next 30 years regardless of whether the Service issues the requested ITP, all alternatives discussed in this EIS would result in unavoidable adverse impacts from loss or modification of Covered Species habitat. However, under the action alternatives, minimization measures for Covered Species would reduce habitat impacts for affected species and associated vegetation communities and general wildlife. Mitigation for adverse impacts would occur through the creation, protection, and/or maintenance or improvement of suitable Covered Species habitat (see Sections 2.1.8.1 and 2.1.8.2 for details).

5.2 Irreversible and Irretrievable Commitment of Resources

NEPA regulations at 40 CFR 1502.16 require that the discussion of environmental consequences include “any irreversible or irretrievable commitments of resources which would be involved in the proposal should it be implemented.” Irreversible resource commitments represent a loss of future options or resources that cannot be regained, such as the extinction of a species or removal of mined ore. An irretrievable commitment represents resources that are foregone for a period of time, such as the loss of timber production due to ROW clearing.

Under all alternatives, surface or subsurface disturbance associated with Covered Activities or other future projects would irretrievably remove or modify Covered Species habitat within the Plan Area. These actions could result in irreversible habitat loss or modification for Covered Species within the Plan Area if former habitat abundance and composition did not recover. However, the LCRA TSC HCP’s prescribed minimization and mitigation measures would help preserve habitat for these species, long-term. The commitment and funding of mitigation and monitoring activities for the duration of the ITP would also be irretrievable.

5.3 Short-Term Use of the Environment Versus Long-Term Productivity

This section supports 40 CFR 1502.16 and provides a discussion of the long-term effects of the LCRA TSC HCP by evaluating the relationship between the short-term uses of the environment and the maintenance and enhancement of long-term productivity. Short-term uses are those that determine the present quality of life for the public. The quality of life for future generations depends on long-term productivity, defined as the capability of the environment to provide ecological resources on a sustainable basis.

The LCRA TSC HCP (Chapter 6.1.2) seeks to achieve the following biological goals and objectives:

- Minimize and mitigate the impacts of incidental take of the Covered Species caused by Covered Activities to the maximum extent practicable.

- Prioritize approaches for mitigation that contribute to landscape-scale conservation.
- Maximize the conservation benefit of mitigation by allocating resources to addressing the threats most relevant to the Covered Species.
- Contribute to the conservation of the Covered Species by providing mitigation for Covered Species for Covered Activities.

All alternatives, including the No Action Alternative, would result in a short-term loss of habitat for the Covered Species in the Plan Area due to human population growth and the associated increase in land development. However, short-term uses of the environment associated with Covered Activities, such as maintenance of existing facilities and clearing activities associated with new construction, would occur in a manner that minimizes and mitigates impacts to the maximum extent practicable. Implementation of minimization and mitigation actions that result in the potential creation, protection, and/or maintenance/improvement of suitable Covered Species habitat would also promote long-term ecological productivity. Thus, maintenance of long-term environmental productivity will occur through LCRA TSC HCP implementation.

CHAPTER 6. EIS AVAILABILITY AND LIST OF PREPARERS

6.1 EIS Distribution

Copies of the Final EIS are available on LCRA's website (<http://www.lcra.org/itp>) and on the Service's website (<https://www.fws.gov/southwest/es/AustinTexas/>). Alternatively, you may obtain compact disks with electronic copies of these documents by writing to the Field Supervisor, U.S. Fish and Wildlife Service, 10711 Burnet Road, Suite 200, Austin, Texas 78758; calling 512-490-0057; or faxing 512-490-0974. A limited number of printed copies of the Final EIS are also available at the above address.

The Service provided Final EIS copies to all tribes that requested to be consulting parties or otherwise requested inclusion in the EIS mailing list.

6.2 List of Preparers

Table 17 provides a list of Service and consultant staff involved in the preparation of this EIS.

Table 17. List of Preparers

Agency or Entity	Name	Role
U.S. Fish and Wildlife Service (Service), Austin Ecological Services Field Office	Christina Williams	Service Biologist
Service, Austin Ecological Services Field Office	Tanya Sommer	Supervisory Fish and Wildlife Biologist
SWCA Environmental Consultants (SWCA)	Sue Wilmot, PhD	NEPA Lead
SWCA	Crystal Allgood, M.S., CEP	NEPA Writer
SWCA	Amber Ballman, M.S.	NEPA Writer
SWCA	Amanda Nicodemus, M.S.	NEPA Writer
SWCA	Jeremy Eyre, J.D.	NEPA Writer
SWCA	Patrick Blair, M.S.	NEPA Writer
SWCA	Patty Riley, AICP-CEP	NEPA Writer
SWCA	Jenna Cantwell, M.N.R.D	NEPA Writer
SWCA	Jason Kainer, B.A.	GIS
SWCA	Lauri Logan, B.S.	Technical Editor

CHAPTER 7. GLOSSARY

Term	Definition
Act	Abbreviation for the Federal Endangered Species Act
Activity Zones	Groups of Plan Area counties used to geographically apportion Covered Activities
Alternative A	Proposed Federal Action
Alternative B	Reduced Permit Duration
Alternative C	No Action Alternate
Annual Report	A report of LCRA TSC HCP activities provided to the Service annually by September 1; the report covers the period between July 1 and June 30 of the prior year
APLIC	Abbreviation for Avian Power Line Interaction Committee
Avoidance Measures	Voluntary conservation measures that reduce the amount of (or completely avoid) incidental take of a listed species
BGEPA	Abbreviation for Bald and Golden Eagle Protection Act
BMPs	Abbreviation for best management practices
CCN	Abbreviation for Certificate of Convenience and Necessity
CEQ	Abbreviation for Council on Environmental Quality
CFR	Abbreviation for the U.S. Code of Federal Regulations
Changed Circumstances	Defined by regulations at 50 CFR 17.3 as “changes in circumstances affecting a species or geographic area covered by a conservation plan or agreement that can reasonably be anticipated by plan or agreement developers and the Service and that can be planned for (e.g., the listing of new species, or a fire or other natural catastrophic event in areas prone to such events)”
Conservation Credit	A measure of mitigation in terms of the number of acres of conservation land that are involved a conservation action, or the equivalent thereof, as adjusted by the relative conservation value of the action
Conservation Program	The voluntary Avoidance Measures, the enrollment process, and the suite of minimization and mitigation measures described in the LCRA TSC HCP
Conservation Provider	A third-party that may be used to implement mitigation on behalf of LCRA TSC
Covered Activity(ies)	A specific instance of one or more Covered Activities performed within a specific geographic area during a specific time, and for which LCRA TSC desires to use the HCP and ITP to authorize incidental take of one or more Relevant Covered Species; together, all Covered Activities that become enrolled in the HCP
Covered Species	Collectively, the set of species for which LCRA TSC seeks incidental take authorization
Critical Habitat	As defined in section 3(5)(A) of the Act
Disturbance	An alteration of land or other habitat characteristic that may involve alterations above the surface (i.e., alteration of vegetation) or alterations at or below the surface (i.e., alterations of the soil or underlying bedrock; subsurface)

Term	Definition
E&S	Abbreviation for erosion and sedimentation
EIS	Abbreviation for Environmental Impact Statement
Emergency Responses	Class of Covered Activities comprising activities similar to New Construction, Upgrading and Decommissioning, and Operations and Maintenance needed to ensure that human health and safety and property are protected and that essential utility services are quickly restored when disrupted
EO	Abbreviation for Executive Order
ERCOT	Abbreviation for the Electric Reliability Council of Texas
Existing Facilities Activity Zone	Plan Area counties that contained Facilities at the time of LCRA TSC HCP preparation (circa 2017) and where LCRA TSC is likely to perform Covered Activities
Existing Impacts	Land uses present at the time a Covered Activity is evaluated under the LCRA TSC HCP that decrease the suitability or quality of Suitable or Occupied Habitat for a Covered Species; generally, applies to any land use or prior disturbance that the Service typically considers as generating an indirect impact on habitat for a Covered Species
Facilities	The structures and lands that LCRA TSC either owns or on which it has rights to construct and maintain through easements or other means
FPPA	Abbreviation for Farmland Protection Policy Act
HCP	Abbreviation for a Habitat Conservation Plan
HCP Contingency Funding	Funds available from LCRA TSC for implementing mitigation related to Emergency Responses, implementing Changed Circumstances, and addressing other contingencies during the ITP Term
HCP Handbook	Abbreviation for the <i>Habitat Conservation Planning and Incidental Take Permit Processing Handbook</i> (Service and NMFS 2016)
ITP	Abbreviation for Incidental Take Permit
ITP Term	The duration of the requested ITP; 30 years from the date of ITP issuance
ITS	Abbreviation for Intelligent Transportation Systems
LCRA	Abbreviation for Lower Colorado River Authority; an affiliate of LCRA TSC
LCRA TSC Covered Activities	Abbreviation for the LCRA Transmission Services Corporation LCRA TSC actions performed within the Plan Area during the ITP Term that, under certain circumstances, are likely to cause incidental take of one or more Covered Species
Mitigation	Conservation actions that offset the impacts of authorized incidental take associated with Covered Activities, as described in Chapter 6.5 of the HCP
MBTA	Abbreviation for Migratory Bird Treaty Act of 1918
NEPA	Abbreviation for the National Environmental Policy Act
New Construction	Class of Covered Activities that create a new Facility or Facilities

Term	Definition
NHPA	Abbreviation for the National Historic Preservation Act
NMFS	Abbreviation for the National Marine Fisheries Service
NOI	Abbreviation for Notice of Intent
NRCS	Abbreviation for Natural Resources Conservation Service
NRHP	Abbreviation for National Register of Historic Places
O&M	Abbreviation for operations and maintenance
Occupied Habitat	Those portions of Suitable Habitat for a Covered Species where regular use by that Covered Species has been demonstrated by a Presence/Absence Survey or has been previously documented; occupancy may be seasonal
Operations and Maintenance	Class of Covered Activities related to the operation and maintenance of Facilities
Other Counties	Plan Area counties that are not included in another Activity Zone
Activity Zone	
Outside ERCOT	Plan Area counties that are outside of ERCOT and where LCRA TSC is unlikely to perform Covered Activities
Activity Zone	
Permit Term	permit term of 30 years
Plan Area	The geographic area where Covered Activities and the Conservation Program may occur, and where incidental take of the Covered Species caused by Covered Activities would be authorized by the ITP Approval of the LCRA TSC HCP and issuance of the requested ITP
Proposed Federal Action	
PUC	Abbreviation for the Public Utility Commission of Texas
Raptors	Class of Covered Species that groups raptors with relatively scarce nest sites and widely distributed foraging habitat; for the purpose of standardizing the estimation of incidental take
ROW	Abbreviation for right-of-way and includes all lands associated with Facilities, including lands associated with linear corridors and site-based support Facilities (such as switching stations and substations)
Specific Minimization Measures	Adjustments to the conduct of Covered Activities that minimize the impacts of incidental take on specific Covered Species; greater levels of mitigation apply when LCRA TSC does not implement Specific Minimization Measures for an Covered Activity
Structures	The physical structures comprising LCRA TSC's transmission lines, site-based support facilities, and access roads
Suitable Habitat	Areas that possess the elements of habitat for a Covered Species and that are delineated by a site-specific habitat assessment; for purposes of the LCRA TSC HCP, occupancy by the Covered Species assumed (assumed occupancy may be seasonal) unless Suitable Habitat is determined through a Presence/Absence Survey to be Unoccupied Habitat
Surrogate Rule	Service regulation at 50 CFR 402.14 that allows section 7 consultations under the Act the use of surrogate measures for quantifying the amount and extent of incidental take where certain criteria have been met

Term	Definition
SWCA	Abbreviation for SWCA Environmental Consultants
SWPPP	Abbreviation for Stormwater Pollution Prevention Plan
TCEQ	Abbreviation for the Texas Commission on Environmental Quality
TCOS	Abbreviation for Transmission Cost of Service, a term related to rate recovery cases before the PUC
TDC	Abbreviation for Texas Demographic Center
Terrestrial Karst Invertebrates	Class of Covered Species that occur in subterranean caves and mesocavernous spaces; for the purpose of standardizing the estimation of incidental take
THC	Abbreviation for Texas Historical Commission
TPWD	Abbreviation for the Texas Parks and Wildlife Department
TWDB	Abbreviation for the Texas Water Development Board
Upgrading and Decommissioning	Class of Covered Activity associated with upgrading an existing Facility or decommissioning an existing Facility
USC	Abbreviation for the United States Code
USDA	Abbreviation for U.S. Department of Agriculture
Service	Abbreviation for the U.S. Fish and Wildlife Service

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Appendix A
Species Evaluation

The following tables document the decision process for including or excluding species for analysis in the LCRA TSC HCP EIS. Species are grouped into three categories:

1. Federally listed wildlife species, or species that are candidates or petitioned for listing
2. Federally listed plant species, or species that are candidates or petitioned for listing
3. Non-federally listed wildlife species²

Species within each category were evaluated using a multi-step process by asking the following questions.

1. Are impacts from Covered Activities possible? This question considered whether each species could be affected by one or more Covered Activity impacts (e.g., vegetation clearing, noise, or collision). Analysis for this question tiered to the LCRA TSC HCP Appendix B, Table 2 findings. Species with no potential for impacts were not carried forward for analysis. For this question, eliminated species predominantly consisted of extirpated species.
2. Is species likely to be exposed to a Covered Activity? This question considered whether Covered Activities would occur within habitats likely to be used by each species. Analysis for this question tiered to the LCRA TSC HCP Appendix B, Table 2 findings. Species that used habitats unlikely to be affected by Covered Activities (such as deep aquifers or marine environments) were not carried forward for analysis.
3. Is species likely to be exposed to a Covered Activity? This question considered whether the known range and occurrence of each species overlapped with the likely locations of Covered Activities. Analysis for this question tiered to the LCRA TSC HCP Appendix G - JAM findings, as well as habitat and range descriptions from NatureServe. Species whose range was outside of anticipated activity areas were not carried forward for analysis.
4. Does LCRA TSC HCP contain measures to address the species through other means or measures to avoid take (federally listed wildlife category only)? This question considered whether the LCRA TSC had measures in place to avoid or substantially minimize impacts to federally listed species that were not Covered Species³. If yes, the species was not carried forward for analysis.
5. All remaining species were carried forward for analysis.

² Note that all considered plant species fell into the federally listed category; there were no plants that fit within the non-federally listed group.

³ Covered Species were carried forward for analysis, as per U.S. Fish and Wildlife Service HCP guidance to disclose impacts associated with proposed incidental take and conservation measures.

Ref. No.	Scientific Name	Common Name	Taxon	General Habitat	Federal Status	Are impacts from Covered Activities possible? See Appendix B, Table 2, Columns 5-11	Is species likely to be exposed to a Covered Activity? See Appendix B, Table 2, Column 14	Does HCP contain measures to address the species through other means or measures to avoid take? See JAM Table, Column 9 and HCP, Section 6.4.	Included in EIS?
1	<i>Eurycea waterlooensis</i>	Austin blind salamander	Amphibians	Deep Aquifer Aquatic	E	Yes	No		No
2	<i>Eurycea sosorum</i>	Barton Springs salamander	Amphibians	Shallow Aquifer / Spring Aquatic	E	Yes	Yes	NA; Covered Species	Yes
3	<i>Notophthalmus meridionalis</i>	Black-spotted newt	Amphibians	Freshwater Surface Aquatic	Petitioned for Listing: Findings Not Yet Made	Yes	Yes	Yes; HCP contains measure to avoid aquatic/wetland habitat	No
4	<i>Eurycea robusta</i>	Blanco blind salamander	Amphibians	Deep Aquifer Aquatic	Petitioned for Listing: 90 Day Substantial	Yes	No		No
5	<i>Eurycea latitans</i>	Cascade Caverns salamander	Amphibians	Shallow Aquifer / Spring Aquatic	Petitioned for Listing with Critical Habitat: 90 Day Substantial	Yes	Yes	Yes; HCP contains measure to avoid Occupied or Assumed Occupied Spring Features	No
6	<i>Eurycea tridentifera</i>	Comal blind salamander	Amphibians	Deep Aquifer Aquatic	Petitioned for Listing: Findings Not Yet Made	Yes	No		No
7	<i>Eurycea sp. 8</i>	Comal Springs salamander	Amphibians	Shallow Aquifer / Spring Aquatic	Petitioned for Listing: 90 Day Substantial	Yes	Yes	Yes; HCP contains measure to avoid Occupied or Assumed Occupied Spring Features	No
8	<i>Eurycea naufragia</i>	Georgetown salamander	Amphibians	Shallow Aquifer / Spring Aquatic	T with Special 4(d) Rule	Yes	Yes	NA; Covered Species	Yes
9	<i>Anaxyrus (syn. Bufo) houstonensis</i>	Houston toad	Amphibians	Aquatic / Terrestrial	E	Yes	Yes	NA; Covered Species	Yes
10	<i>Eurycea tonkawae</i>	Jollyville Plateau salamander	Amphibians	Shallow Aquifer / Spring Aquatic	T	Yes	Yes	NA; Covered Species	Yes
13	<i>Eurycea chisholmensis</i>	Salado Springs salamander	Amphibians	Shallow Aquifer / Spring Aquatic	T	Yes	Yes	NA; Covered Species	Yes
14	<i>Eurycea nana</i>	San Marcos salamander	Amphibians	Shallow Aquifer / Spring Aquatic	T	Yes	Yes	NA; Covered Species	Yes
17	<i>Typhlomolge (syn. Eurycea) rathbuni</i>	Texas blind salamander	Amphibians	Deep Aquifer Aquatic	E	Yes	No		No
18	<i>Eurycea neotenes</i>	Texas salamander	Amphibians	Shallow Aquifer / Spring Aquatic	Petitioned for Listing: 90 Day Substantial	Yes	Yes	Yes; HCP contains measure to avoid Occupied or Assumed Occupied Spring Features	No
20	<i>Texella reddelli</i>	Bee Creek Cave harvestman	Arachnids	Terrestrial Karst	E	Yes	Yes	NA; Covered Species	Yes
21	<i>Texella reyesi</i>	Bone Cave harvestman	Arachnids	Terrestrial Karst	E; petitioned for delisting	Yes	Yes	Yes; HCP includes a commitment to rely on other mechanisms for ESA compliance and includes voluntary Avoidance Measures, General and Species-specific Minimization Measures that include avoidance of Occupied or Assumed Occupied Karst Features	No
22	<i>Cicurina venii</i>	Braken Bat Cave meshweaver	Arachnids	Terrestrial Karst	E	Yes	Yes	Yes; HCP includes voluntary Avoidance Measures, General and Species-specific Minimization Measures that include avoidance of Occupied or Assumed Occupied Karst Features	No
23	<i>Texella cokendolpheri</i>	Cokendolpher Cave harvestman	Arachnids	Terrestrial Karst	E	Yes	Yes	Yes; HCP includes a commitment to rely on other mechanisms for ESA compliance and includes voluntary Avoidance Measures, General and Species-specific Minimization Measures that include avoidance of Occupied or Assumed Occupied Karst Features	No
24	<i>Cicurina vespera</i>	Government Canyon Bat Cave meshweaver	Arachnids	Terrestrial Karst	E	Yes	Yes	Yes; HCP includes a commitment to rely on other mechanisms for ESA compliance and includes voluntary Avoidance Measures, General and Species-specific Minimization Measures that include avoidance of Occupied or Assumed Occupied Karst Features	No

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25	<i>Tayshaneta microps</i>	Government Canyon Bat Cave spider	Arachnids	Terrestrial Karst	E	Yes	Yes	NA; Covered Species	Yes
26	<i>Cicurina madla</i>	Madla Cave meshweaver	Arachnids	Terrestrial Karst	E	Yes	Yes	NA; Covered Species	Yes
27	<i>Cicurina baronia</i>	Robber Baron Cave meshweaver	Arachnids	Terrestrial Karst	E	Yes	Yes	Yes; HCP includes a commitment to rely on other mechanisms for ESA compliance and includes voluntary Avoidance Measures, General and Species-specific Minimization Measures that include avoidance of Occupied or Assumed Occupied Karst Features	No
29	<i>Tartarocreagris texana</i>	Tooth Cave pseudoscorpion	Arachnids	Terrestrial Karst	E	Yes	Yes	Yes; HCP includes a commitment to rely on other mechanisms for ESA compliance and includes voluntary Avoidance Measures, General and Species-specific Minimization Measures that include avoidance of Occupied or Assumed Occupied Karst Features	No
30	<i>Tayshaneta myopica</i>	Tooth Cave spider	Arachnids	Terrestrial Karst	E	Yes	Yes	NA; Covered Species	Yes
32	<i>Tympanuchus cupido attwateri</i>	Attwater's greater prairie-chicken	Birds	Terrestrial	E	Yes	No		No
35	<i>Laterallus jamaicensis</i>	Black rail	Birds	Wetlands	Petitioned for Listing with Critical Habitat: 90 Day Substantial	Yes	No		No
39	<i>Numenius borealis</i>	Eskimo curlew	Birds	Terrestrial	E	No			No
40	<i>Setophaga chrysoparia</i>	Golden-cheeked warbler	Birds	Terrestrial	E	Yes	Yes	NA; Covered Species	Yes
41	<i>Vermivora chrysoptera</i>	Golden-winged warbler	Birds	Terrestrial	Petitioned for Listing: 90 Day Substantial	Yes	No		No
43	<i>Sterna antillarum athalassos</i>	Interior least tern[32]	Birds	Riparian	E	Yes	No		No
44	<i>Tympanuchus pallidicinctus</i>	Lesser prairie- chicken	Birds	Terrestrial	Petitioned for Listing as E with Critical Habitat: 90 Day Substantial	Yes	No		No
45	<i>Strix occidentalis lucida</i>	Mexican spotted owl	Birds	Terrestrial	T	Yes	No		No
46	<i>Falco femoralis septentrionalis</i>	Northern aplomado falcon	Birds	Terrestrial	E, Petitioned for Critical Habitat: Findings Not Yet Made	Yes	No		No
48	<i>Charadrius melodus</i>	Piping plover	Birds	Marine or Freshwater Aquatic	T	Yes	Yes	NA; Covered Species	Yes
49	<i>Calidris canutus rufa</i>	Red knot	Birds	Terrestrial	T	Yes	Yes	NA; Covered Species	Yes
50	<i>Picoides borealis</i>	Red-cockaded woodpecker	Birds	Terrestrial	E	Yes	Yes	NA; Covered Species	Yes
51	<i>Amazona viridigenalis</i>	Red-crowned parrot	Birds	Terrestrial	Candidate	Yes	No		No
55	<i>Empidonax traillii extimus</i>	Southwestern willow flycatcher	Birds	Terrestrial	E, Petitioned for Delisting: 90 Day Substantial	Yes	Yes	Yes, HCP minimization measures will minimize, to the extent practicable, the removal of woody vegetation from wetlands, riparian areas, and aquatic habitats	No
59	<i>Coccyzus americanus</i>	Western yellow-billed cuckoo	Birds	Terrestrial	T	Yes	No		No
62	<i>Grus americana</i>	Whooping crane	Birds	Wetland	E	Yes	Yes	NA; Covered Species	Yes
63	<i>Mycteria americana</i>	Wood stork	Birds	Terrestrial	T	Yes	No		No
65	<i>Gammarus hyalelloides</i>	Diminutive amphipod	Crustaceans	Shallow Aquifer / Spring Aquatic	E	Yes	No		No
66	<i>Orconectes maletae</i>	Kisatchie painted crayfish	Crustaceans	Freshwater Aquatic	Petitioned for Listing with Critical Habitat: 90 Day Substantial	Yes	No		No
67	<i>Stygobromus pecki</i>	Peck's cave amphipod	Crustaceans	Shallow Aquifer / Spring Aquatic	E	Yes	Yes	NA; Covered Species	Yes
68	<i>Gammarus pecos</i>	Pecos amphipod	Crustaceans	Shallow Aquifer / Spring Aquatic	E	Yes	No		No
69	<i>Notropis girardi</i>	Arkansas River shiner	Fishes	Freshwater Aquatic	T	Yes	No		No

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70	<i>Macrhybopsis tetranema</i>	Peppered chub	Fishes	Freshwater Aquatic	Petitioned for Listing: 90 Day Substantial	Yes	No		No
71	<i>Gambusia gaigei</i>	Big Bend gambusia	Fishes	Freshwater Aquatic	E	Yes	No		No
75	<i>Pteronotropis hubbsi</i>	Bluehead shiner	Fishes	Freshwater Aquatic	Petitioned for Listing with Critical Habitat: 90 Day Substantial	Yes	No		No
77	<i>Ictalurus sp. 1</i>	Chihuahua catfish	Fishes	Freshwater Aquatic	Petitioned for Listing: 90 Day Substantial	Yes	No		No
79	<i>Gambusia heterochir</i>	Clear Creek gambusia	Fishes	Freshwater Aquatic	E	Yes	No		No
80	<i>Cyprinodon elegans</i>	Comanche Springs pupfish	Fishes	Freshwater Aquatic	E	Yes	No		No
82	<i>Dionda diaboli</i>	Devils River minnow	Fishes	Freshwater Aquatic	T	Yes	No		No
83	<i>Etheostoma fonticola</i>	Fountain darter	Fishes	Freshwater Aquatic	E	Yes	No		No
84	<i>Cyprinodon bovinus</i>	Leon Springs pupfish	Fishes	Freshwater Aquatic	E	Yes	No		No
85	<i>Prietella phreatophila</i>	Mexican blindcat	Fishes	Freshwater Aquatic	E	Yes	No		No
88	<i>Cyprinella sp. 2</i>	Nueces shiner	Fishes	Freshwater Aquatic	Petitioned for Listing: 12 Month Not Warranted	Yes	No		No
91	<i>Gambusia nobilis</i>	Pecos gambusia	Fishes	Freshwater Aquatic	E	Yes	No		No
92	<i>Cyprinodon pecosensis</i>	Pecos pupfish	Fishes	Freshwater Aquatic	Petitioned for Listing: 90 Day Substantial	Yes	No		No
93	<i>Cyprinella lepida</i>	Plateau shiner	Fishes	Freshwater Aquatic	Petitioned for Listing: 12 Month Not Warranted	Yes	No		No
94	<i>Macrhybopsis australis</i>	Prairie chub	Fishes	Freshwater Aquatic	Petitioned for Listing with Critical Habitat: 90 Day Substantial	Yes	No		No
98	<i>Hybognathus amarus</i>	Rio Grande silvery minnow	Fishes	Freshwater Aquatic	E	No			No
100	<i>Gambusia clarkhubbsi</i>	San Felipe gambusia	Fishes	Freshwater Aquatic	Petitioned for Listing: 90 Day Substantial	Yes	No		No
101	<i>Gambusia georgei</i>	San Marcos gambusia	Fishes	Freshwater Aquatic	E	No			No
102	<i>Notropis oxyrhynchus</i>	Sharpnose shiner	Fishes	Freshwater Aquatic	E	Yes	No		No
103	<i>Scaphirhynchus platyrhynchus</i>	Shovelnose sturgeon	Fishes	Freshwater Aquatic	T- Similarity of appearance to the pallid sturgeon (<i>Scaphirhynchus albus</i>)[57]	Yes	No		No
104	<i>Notropis buccula</i>	Smalleye shiner	Fishes	Freshwater Aquatic	E	Yes	No		No
105	<i>Pristis pectinata</i>	Smalltooth sawfish	Fishes	Marine Aquatic	E	No			No
106	<i>Trogloglanis pattersoni</i>	Toothless blindcat	Fishes	Freshwater Aquatic	Petitioned for Listing: 90 Day Substantial	Yes	No		No
108	<i>Satan eurystomus</i>	Widemouth blindcat	Fishes	Freshwater Aquatic	Petitioned for Listing: 90 Day Substantial	Yes	No		No
109	<i>Rhadine exilis</i>	A ground beetle	Insects	Terrestrial Karst	E	Yes	Yes	NA; Covered Species	Yes
110	<i>Rhadine infernalis</i>	A ground beetle	Insects	Terrestrial Karst	E	Yes	Yes	NA; Covered Species	Yes
111	<i>Nicrophorus americanus</i>	American burying beetle	Insects	Terrestrial	E, Petitioned for Delisting: 90 Day Substantial	Yes	No		No
112	<i>Batrises texanus</i>	Inner Space Cavern mold beetle	Insects	Terrestrial Karst	E	Yes	Yes	Yes; HCP includes a commitment to rely on other mechanisms for ESA compliance and includes voluntary Avoidance Measures, General and Species-specific Minimization Measures that include avoidance of Occupied or Assumed Occupied Karst Features	No
114	<i>Stygoparnus comalensis</i>	Comal Springs dryopid beetle	Insects	Shallow Aquifer / Spring Aquatic	E	Yes	Yes	Yes; HCP contains measure to avoid Occupied or Assumed Occupied Spring Features	No
115	<i>Heterelmis comalensis</i>	Comal Springs riffle beetle	Insects	Shallow Aquifer / Spring Aquatic	E	Yes	Yes	NA; Covered Species	Yes

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116	<i>Haideoporus texanus</i>	Edwards Aquifer diving beetle	Insects	Shallow Aquifer / Spring Aquatic	Petitioned for Listing: 90 Day Substantial	Yes	No		No
117	<i>Batrisodes ventyivi</i>	Helotes mold beetle	Insects	Terrestrial Karst	E	Yes	Yes	NA; Covered Species	Yes
118	<i>Texamaurops reddelli</i>	Kretschmarr Cave mold beetle	Insects	Terrestrial Karst	E	Yes	Yes	Yes; HCP includes a commitment to rely on other mechanisms for ESA compliance and includes voluntary Avoidance Measures, General and Species-specific Minimization Measures that include avoidance of Occupied or Assumed Occupied Karst Features	No
119	<i>Automeris louisiana</i>	Louisiana eyed silkmoth	Insects	Aquatic / Terrestrial	Petitioned for Listing with Critical Habitat: 90 Day Substantial	Yes	No		No
120	<i>Danaus plexippus plexippus</i>	Monarch butterfly	Insects	Terrestrial	Petitioned for Listing T with Critical Habitat: 90 Day Substantial	Yes	Yes	Yes, See general HCP minimization measures	No
121	<i>Lepidostoma morsei</i>	Morse's little plain brown sedge	Insects	Aquatic / Terrestrial	Petitioned for Listing with Critical Habitat: 90 Day Substantial	Yes	Yes	Yes, HCP minimization measures will minimize, to the extent practicable, the removal of woody vegetation from wetlands, riparian areas, and aquatic habitats	No
122	<i>Somatochlora margarita</i>	Texas emerald	Insects	Aquatic / Terrestrial	Petitioned for Listing with Critical Habitat: 90 Day Substantial	Yes	No		No
123	<i>Lirceolus smithii</i>	Texas troglobitic water slater	Insects	Freshwater Aquatic	Petitioned for Listing: 90 Day Substantial	Yes	No		No
124	<i>Rhadine persephone</i>	Tooth Cave ground beetle	Insects	Terrestrial Karst	E	Yes	Yes	NA; Covered Species	Yes
126	<i>Mustela nigripes</i>	Black-footed ferret	Mammals	Terrestrial	E	No			No
128	<i>Herpailurus yagouaroundi cacomitli</i>	Gulf Coast jaguarundi	Mammals	Terrestrial	E, Petitioned for Critical Habitat: Findings Not Yet Made	No			No
129	<i>Canis lupus</i>	Gray wolf	Mammals	Terrestrial	E	No			No
130	<i>Panthera onca</i>	Jaguar	Mammals	Terrestrial	E	Yes	No		No
133	<i>Leptonycteris nivalis</i>	Mexican long-nosed bat	Mammals	Terrestrial	E	Yes	No		No
134	<i>Leopardus pardalis</i>	Ocelot	Mammals	Terrestrial	E, Petitioned for Critical Habitat: Findings Not Yet Made	Yes	Yes	NA; Covered Species	Yes
137	<i>Canis rufus</i>	Red wolf	Mammals	Terrestrial	E	No			No
140	<i>Dipodomys elator</i>	Texas kangaroo rat	Mammals	Terrestrial	Petitioned for Listing with Critical Habitat: 90 Day Substantial	Yes	No		No
141	<i>Perimyotis subflavus</i>	Tri-colored bat	Mammals	Terrestrial	Petitioned for Listing: Under review	Yes	Yes	Yes, HCP minimization measures will minimize, to the extent practicable, the removal of woody vegetation from wetlands, riparian areas, and aquatic habitats	No
142	<i>Trichechus manatus</i>	West Indian manatee	Mammals	Marine Aquatic	E, Petitioned for increased protections: Findings Not Yet Made; Petition to Revise Critical Habitat: 90 Day Substantial; Petition for Downlisting: 90 Day Substantial	Yes	No		No
144	<i>Pseudotryonia adamantina</i>	Diamond tryonia	Mollusks	Freshwater Aquatic	E	Yes	No		No
145	<i>Fusconaia (syn. Quincuncina) mitchelli</i>	False spike	Mollusks	Freshwater Aquatic	Petitioned for Listing: 90 Day Substantial	Yes	No		No
146	<i>Radiocentrum ferrissi</i>	Fringed mountainsnail	Mollusks	Terrestrial[76]	Petitioned for Listing: 90 Day Not Substantial	No			No
147	<i>Quadrula aurea</i>	Golden orb	Mollusks	Freshwater Aquatic	Candidate	Yes	No		No
148	<i>Tryonia circumstriata</i>	Gonzales tryonia	Mollusks	Freshwater Aquatic	E	Yes	No		No

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149	<i>Pleurobema riddellii</i>	Louisiana pigtoe	Mollusks	Freshwater Aquatic	Petitioned for Listing: 90 Day Substantial	Yes	No		No
150	<i>Truncilla cognata</i>	Mexican fawnsfoot	Mollusks	Freshwater Aquatic	Petitioned for Listing: 90 Day Substantial	Yes	No		No
151	<i>Phreatodrobia imitata</i>	Mimic cavesnail	Mollusks	Freshwater Aquatic	Petitioned for Listing: 90 Day Substantial	Yes	No		No
152	<i>Arkansia wheeleri</i>	Ouachita rock pocketbook	Mollusks	Freshwater Aquatic	E	Yes	No		No
153	<i>Assiminea pecos</i>	Pecos assiminea snail	Mollusks	Aquatic / Terrestrial[77]	E	Yes	No		No
154	<i>Pyrgulopsis texana</i>	Phantom Cave springsnail	Mollusks	Freshwater Aquatic	E	Yes	No		No
155	<i>Tryonia cheatumi</i>	Phantom tryonia	Mollusks	Freshwater Aquatic	E	Yes	No		No
156	<i>Potamilus metnecktayi</i>	Salina mucket	Mollusks	Freshwater Aquatic	Petitioned for Listing: Findings Not Yet Made	Yes	No		No
158	<i>Quadrula houstonensis</i>	Smooth pimpleback	Mollusks	Freshwater Aquatic	Candidate	Yes	No		No
160	<i>Lampsilis bracteata</i>	Texas fatmucket	Mollusks	Freshwater Aquatic	Candidate	Yes	No		No
161	<i>Truncilla macrodon</i>	Texas fawnsfoot	Mollusks	Freshwater Aquatic	Candidate	Yes	No		No
162	<i>Potamilus amphichaenus</i>	Texas heelsplitter	Mollusks	Freshwater Aquatic	Petitioned for Listing: Findings Not Yet Made	Yes	No		No
163	<i>Popenaias popeii</i>	Texas hornshell	Mollusks	Freshwater Aquatic	E	Yes	No		No
165	<i>Quadrula petrina</i>	Texas pimpleback	Mollusks	Freshwater Aquatic	Candidate	Yes	No		No
166	<i>Fusconaia lananensis</i>	Triangle pigtoe	Mollusks	Freshwater Aquatic	Petitioned for Listing: 90 Day Substantial	Yes	No		No
218	<i>Macrochelys temminckii</i>	Alligator snapping turtle	Reptiles	Freshwater Aquatic	Petitioned for Listing with Critical Habitat: 90 Day Substantial	Yes	No		No
219	<i>Eretmochelys imbricata</i>	Atlantic hawksbill sea turtle	Reptiles	Marine Aquatic	E	Yes	No		No
227	<i>Chelonia mydas</i>	Green sea turtle	Reptiles	Marine Aquatic	T	Yes	No		No
228	<i>Lepidochelys kempii</i>	Kemp's ridley sea turtle	Reptiles	Marine Aquatic	E, Petitioned for Critical Habitat: Findings Not Yet Made	Yes	No		No
229	<i>Dermochelys coriacea</i>	Leatherback sea turtle	Reptiles	Marine Aquatic	E	Yes	No		No
230	<i>Caretta caretta</i>	Loggerhead sea turtle	Reptiles	Marine Aquatic	T	Yes	No		No
231	<i>Pituophis ruthveni</i>	Louisiana pine snake	Reptiles	Terrestrial	T	Yes	No		No
237	<i>Pseudemys gorzugi</i>	Rio Grande cooter	Reptiles	Freshwater Aquatic	Petitioned for Listing: 90 Day Substantial	Yes	No		No
240	<i>Holbrookia lacerata</i>	Spot-tailed earless lizard	Reptiles	Terrestrial	Petitioned for Listing with Critical Habitat: 90 Day Substantial	Yes	Yes	NA: Covered Species	Yes
247	<i>Deirochelys reticularia miaria</i>	Western chicken turtle	Reptiles	Freshwater Aquatic	Petitioned for Listing with Critical Habitat: 90 Day Substantial	Yes	No		No

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167	<i>Thymophylla tephroleuca</i>	Ashy dogweed	Plants	Terrestrial	E	Yes	Yes	No	No
168	<i>Salvia pentstemonoides</i>	Big red sage	Plants	Terrestrial	Petitioned for Listing: 90 Day Substantial	Yes	Yes	Yes	Yes
169	<i>Echinocereus reichenbachii</i> var <i>albertii</i>	Black lace cactus	Plants	Terrestrial	E	Yes	Yes	Yes	Yes
170	<i>Streptanthus bracteatus</i>	Bracted twistflower	Plants	Terrestrial	Candidate	Yes	Yes	Yes	Yes
171	<i>Genistidium dumosum</i>	Brush-pea	Plants	Terrestrial	Petitioned for Listing: 90 Day Substantial	Yes	Yes	No	No
172	<i>Coryphantha ramillosa</i>	Bunched Cory cactus	Plants	Terrestrial	T	Yes	Yes	No	No
173	<i>Paronychia congesta</i>	Bushy whitlowwort	Plants	Terrestrial	Petitioned for Listing: 90 Day Substantial	Yes	Yes	No	No
174	<i>Pediomelum pentaphyllum</i>	Chihuahua scurfpea	Plants	Terrestrial	Petitioned for Listing: 90 Day Substantial	No			No
175	<i>Hexalectris revoluta</i>	Chisos coralroot	Plants	Terrestrial	Petitioned for Listing: 90 Day Substantial	No			No
176	<i>Echinocereus chisoensis</i> var <i>chisoensis</i>	Chisos Mountains hedgehog cactus	Plants	Terrestrial	T	Yes	Yes	No	No
177	<i>Phystostegia correllii</i>	Correll's false dragon-head	Plants	Freshwater Aquatic	Petitioned for Listing with Critical Habitat: 90 Day Substantial	Yes	No		No
178	<i>Cyperus cephalanthus</i>	Cryptic flatsedge	Plants	Terrestrial	Petitioned for Listing: 90 Day Not Substantial	Yes	Yes	Yes	Yes
179	<i>Echinocereus davisii</i>	Davis' green pitaya	Plants	Terrestrial	E	Yes	No		No
180	<i>Donrichardsia macroneuron</i>	Don Richard's spring moss	Plants	A/T[86]	Petitioned for Listing: 90 Day Substantial	Yes	No		No
181	<i>Geocarpon minimum</i>	Earth fruit (Tinytim)	Plants	Terrestrial	T	Yes	No		No
182	<i>Festuca ligulata</i>	Guadalupe fescue	Plants	Terrestrial	E	No			No
183	<i>Schoenoplectus hallii</i>	Hall's bulrush	Plants	A/T	Petitioned for Listing with Critical Habitat: 90 Day Substantial	Yes	Yes	No	No
184	<i>Fissidens hallii</i>	Hall's pocket moss	Plants	Freshwater Aquatic	Petitioned for Listing with Critical Habitat: 90 Day Substantial	Yes	Yes	Yes	Yes
185	<i>Quercus hinckleyi</i>	Hinckley's oak	Plants	Terrestrial	T	Yes	Yes	No	No
186	<i>Frankenia johnstonii</i>	Johnston's frankenia	Plants	Terrestrial	Delisted	Yes	Yes	Yes	Yes
187	<i>Abronia macrocarpa</i>	Large-fruited sand-verbena	Plants	Terrestrial	E	Yes	Yes	Yes	Yes
188	<i>Agalinis calycina</i>	Leoncita false-foxglove	Plants	Freshwater Aquatic	Petitioned for Listing: 90 Day Substantial	Yes	No		No
189	<i>Potamogeton clystocarpus</i>	Little Aguja pondweed	Plants	Freshwater Aquatic	E	Yes	No		No
190	<i>Sclerocactus mariposensis</i>	Lloyd's mariposa cactus	Plants	Terrestrial	T	Yes	Yes	Yes	Yes
191	<i>Agalinis navasotensis</i>	Navasota false foxglove	Plants	Terrestrial	Petitioned for Listing: 90 Day Substantial	Yes	Yes	Yes	Yes
192	<i>Spiranthes parksii</i>	Navasota ladies' tresses	Plants	Terrestrial	E, Petitioned for Delisting: 90 Day Not Substantial	Yes	Yes	Yes	Yes
193	<i>Hibiscus dasycalyx</i>	Neches River rose-mallow	Plants	Terrestrial	T	Yes	Yes	Yes	Yes
194	<i>Escobaria</i> (syn. <i>Coryphantha</i>) <i>minima</i>	Nellie Cory cactus	Plants	Terrestrial	E	Yes	No		No
195	<i>Helianthus paradoxus</i>	Pecos/Puzzle sunflower	Plants	Terrestrial	T	Yes	No		No
196	<i>Asclepias prostrata</i>	Prostrate milkweed	Plants	Terrestrial	Petitioned for Listing: 90 Day Substantial	Yes	Yes	No	No
197	<i>Symphyotrichum puniceum</i> var. <i>scabricaule</i>	Rough-stemmed aster	Plants	Freshwater Aquatic	Petitioned for Listing with Critical Habitat: 90 Day Substantial	Yes	No		No
198	<i>Helianthus occidentalis</i> ssp. <i>plantagineus</i>	Shinner's sunflower	Plants	Terrestrial	Petitioned for Listing with Critical Habitat: 90 Day Substantial	Yes	Yes	Yes	Yes
199	<i>Hoffmannseggia tenella</i>	Slender rushpea	Plants	Terrestrial	E	Yes	Yes	Yes	Yes
200	<i>Eriocaulon koernickianum</i>	Small-headed pipewort	Plants	Freshwater Aquatic	Petitioned for Listing with Critical Habitat: 90 Day Substantial	Yes	No		No
201	<i>Ambrosia cheiranthifolia</i>	South Texas ambrosia	Plants	Terrestrial	E	Yes	Yes	Yes	Yes
202	<i>Astrophytum asterias</i>	Star cactus	Plants	Terrestrial	E	Yes	Yes	Yes	Yes
203	<i>Cryptantha crassipes</i>	Terlingua Creek cat's-eye	Plants	Terrestrial	E	Yes	No		No
204	<i>Ayenia limitaris</i>	Texas ayenia	Plants	Terrestrial	E	Yes	Yes	Yes	Yes

Ref. No.	Scientific Name	Common Name	Taxon	General Habitat	Federal Status	Are impacts from Covered Activities possible? See Appendix B, Table 2, Columns 5-11	Is species likely to be exposed to a Covered Activity? See Appendix B, Table 2, Column 14	Is species likely to be exposed to an Enrolled Covered Activity? See JAM Table, Column 9	Included in EIS?
205	<i>Leavenworthia texana</i>	Texas golden gladeceess	Plants	Terrestrial	E	Yes	No		No
206	<i>Callirhoe scabriuscula</i>	Texas poppy-mallow	Plants	Terrestrial	E	Yes	Yes	Yes	Yes
207	<i>Hymenoxys texana</i>	Texas prairie dawn	Plants	Terrestrial	E	Yes	Yes	Yes	Yes
208	<i>Bartonia texana</i>	Texas screwstem	Plants	Freshwater Aquatic	Petitioned for Listing with Critical Habitat: 90 Day Substantial	Yes	No		No
209	<i>Styrax texanus</i> (Syn. <i>Styrax platanifolius</i> ssp <i>texanus</i>)	Texas snowbells	Plants	Terrestrial	E	Yes	Yes	Yes	Yes
210	<i>Phlox nivalis</i> ssp <i>texensis</i>	Texas trailing phlox	Plants	Terrestrial	E	Yes	Yes	Yes	Yes
211	<i>Trillium texanum</i>	Texas trillium	Plants	Terrestrial	Petitioned for Listing with Critical Habitat: 90 Day Substantial	Yes	Yes	Yes	Yes
212	<i>Zizania texana</i>	Texas wild rice	Plants	Freshwater Aquatic	E	Yes	No		No
213	<i>Amsonia tharpai</i>	Tharp's blue-star	Plants	Terrestrial	Petitioned for Listing: 90 Day Substantial	Yes	Yes	No	No
214	<i>Sclerocactus brevihamatus</i> ssp. <i>tobuschii</i>	Tobusch fishhook cactus	Plants	Terrestrial	E, Proposed for Downlisting	Yes	Yes	Yes	Yes
215	<i>Manihot walkerae</i>	Walker's manioc	Plants	Terrestrial	E	Yes	Yes	Yes	Yes
216	<i>Physaria pallida</i>	White bladderpod	Plants	Terrestrial	E	Yes	Yes	Yes	Yes
217	<i>Physaria thamnophila</i>	Zapata bladderpod	Plants	Terrestrial	E	Yes	Yes	No	No

Ref. No.	Scientific Name	Common Name	Taxon	General Habitat	Are impacts from Covered Activities possible? See Appendix B, Table 2, Columns 5-11	Is species likely to be exposed to a Covered Activity? See Appendix B, Table 2, Column 14	Is species likely to be exposed to an Enrolled Covered Activity? See Notes Column	Included in EIS?	Notes
11	<i>Rhinophrynus dorsalis</i>	Mexican burrowing toad	Amphibians	Aquatic / Terrestrial[10]	Yes	No		No	
12	<i>Smilisca baudinii</i>	Mexican treefrog	Amphibians	Aquatic / Terrestrial	Yes	No		No	
15	<i>Hypopachus variolosus</i>	Sheep frog	Amphibians	Aquatic / Terrestrial[12]	Yes	Yes	Yes	Yes	This species may occur within the known range or distribution of Covered Species and could be exposed to and adversely affected by Enrolled Covered Activities.
16	<i>Siren sp 1</i>	South Texas siren (large form)	Amphibians	Freshwater Aquatic	Yes	No		No	
19	<i>Leptodactylus fragilis</i>	White-lipped frog	Amphibians	Aquatic / Terrestrial	Yes	Yes	Yes	Yes	This species may occur within the known range or distribution of Covered Species and could be exposed to and adversely affected by Enrolled Covered Activities.
28	<i>Cicurina loftini</i>	no common name	Arachnids	Terrestrial Karst	Yes	Yes	No	No	This species may occur within the known range or distribution of Covered Species but is unlikely to be affected by Enrolled Covered Activities due to measures to avoid Occupied or Assumed Occupied Karst Features
31	<i>Falco peregrinus anatum</i>	American peregrine falcon	Birds	Terrestrial	Yes	Yes	No	No	Exposure to Enrolled Covered Activities is unlikely due to its restricted range.
33	<i>Peucaea (syn. Aimophila) aestivalis</i>	Bachman's sparrow	Birds	Terrestrial	Yes	Yes	Yes	Yes	This species may occur within the known range or distribution of Covered Species and could be exposed to and adversely affected by Enrolled Covered Activities.
34	<i>Haliaeetus leucocephalus</i>	Bald eagle	Birds	Terrestrial	Yes	Yes	Yes	Yes	This species may occur within the known range or distribution of Covered Species and could be exposed to and adversely affected by Enrolled Covered Activities.
36	<i>Vireo atricapilla</i>	Black-capped vireo	Birds	Terrestrial	Yes	Yes	Yes	Yes	This species may occur within the known range or distribution of Covered Species and could be exposed to and adversely affected by Enrolled Covered Activities.
37	<i>Glaucidium brasilianum cactorum</i>	Cactus ferruginous pygmy-owl	Birds	Terrestrial	Yes	Yes	Yes	Yes	This species may occur within the known range or distribution of Covered Species and could be exposed to and adversely affected by Enrolled Covered Activities.
38	<i>Buteogallus anthracinus</i>	Common black-hawk	Birds	Terrestrial	Yes	No		No	
42	<i>Buteo plagiatus (syn. Asturina nitida)</i>	Gray hawk	Birds	Terrestrial	Yes	No		No	
47	<i>Camptostoma imberbe</i>	Northern beardless-tyrannulet	Birds	Terrestrial	Yes	Yes	No	No	Exposure to Enrolled Covered Activities is unlikely due to its restricted range.
52	<i>Egretta rufescens</i>	Reddish egret	Birds	Terrestrial	Yes	No		No	
53	<i>Pachyrhamphus aglaiae</i>	Rose-throated becard	Birds	Terrestrial	Yes	No		No	
54	<i>Sterna fuscata</i>	Sooty tern	Birds	Terrestrial	Yes	No		No	
56	<i>Elanoides forficatus</i>	Swallow-tailed kite	Birds	Terrestrial	Yes	Yes	No	No	Exposure to Enrolled Covered Activities is unlikely due to its restricted range.
57	<i>Peucaea botterii texana</i>	Texas Botteri's sparrow	Birds	Terrestrial	Yes	Yes	Yes	Yes	This species may occur within the known range or distribution of Covered Species and could be exposed to and adversely affected by Enrolled Covered Activities.
58	<i>Setophaga pitiayumi</i>	Tropical parula	Birds	Terrestrial	Yes	Yes	Yes	Yes	This species may occur within the known range or distribution of Covered Species and could be exposed to and adversely affected by Enrolled Covered Activities.
60	<i>Plegadis chihi</i>	White-faced ibis	Birds	Terrestrial	Yes	Yes	Yes	Yes	This species may occur within the known range or distribution of Covered Species and could be exposed to and adversely affected by Enrolled Covered Activities.
61	<i>Geranoaetus (syn. Buteo) albicaudatus</i>	White-tailed hawk	Birds	Terrestrial	Yes	Yes	Yes	Yes	This species may occur within the known range or distribution of Covered Species and could be exposed to and adversely affected by Enrolled Covered Activities.
64	<i>Buteo albonotatus</i>	Zone-tailed hawk	Birds	Terrestrial	Yes	Yes	Yes	Yes	This species may occur within the known range or distribution of Covered Species and could be exposed to and adversely affected by Enrolled Covered Activities.
72	<i>Percina maculata</i>	Blackside darter	Fishes	Freshwater Aquatic	Yes	No		No	
73	<i>Gambusia senilis</i>	Blotched gambusia	Fishes	Freshwater Aquatic	No			No	
74	<i>Cycleptus elongatus</i>	Blue sucker	Fishes	Freshwater Aquatic	Yes	No		No	
76	<i>Notropis simus simus</i>	Bluntnose shiner	Fishes	Freshwater Aquatic	No			No	
78	<i>Notropis chihuahua</i>	Chihuahua shiner	Fishes	Freshwater Aquatic	Yes	No		No	
81	<i>Cyprinodon eximius</i>	Conchos pupfish	Fishes	Freshwater Aquatic	Yes	No		No	
86	<i>Ctenogobius claytonii</i>	Mexican goby	Fishes	Freshwater Aquatic	Yes	No		No	
87	<i>Campostoma ornatum</i>	Mexican stoneroller	Fishes	Freshwater Aquatic	Yes	No		No	

Ref. No.	Scientific Name	Common Name	Taxon	General Habitat	Are impacts from Covered Activities possible? See Appendix B, Table 2, Columns 5-11	Is species likely to be exposed to a Covered Activity? See Appendix B, Table 2, Column 14	Is species likely to be exposed to an Enrolled Covered Activity? See Notes Column	Included in EIS?	Notes
89	<i>Microphis brachyurus</i>	Opossum pipefish	Fishes	Aquatic	Yes	No		No	
90	<i>Polyodon spathula</i>	Paddlefish	Fishes	Freshwater Aquatic	Yes	No		No	
95	<i>Cyprinella proserpina</i>	Proserpine shiner	Fishes	Freshwater Aquatic	Yes	No		No	
96	<i>Gila pandora</i>	Rio Grande chub	Fishes	Freshwater Aquatic	Yes	No		No	
97	<i>Etheostoma grahami</i>	Rio Grande darter	Fishes	Freshwater Aquatic	Yes	No		No	
99	<i>Awaous banana</i>	River goby	Fishes	Freshwater Aquatic	Yes	No		No	
107	<i>Erimyzon oblongus</i>	Western Creek chubsucker	Fishes	Freshwater Aquatic	Yes	No		No	
113	<i>Batrisesodes cryptotexanus</i>	Dragonfly Cave mold beetle	Insects	Terrestrial Karst	Yes	Yes	No	No	This species may occur within the known range or distribution of Covered Species but is unlikely to be affected by Enrolled Covered Activities due to measures to avoid Occupied or Assumed Occupied Karst Features
125	<i>Ursus americanus</i>	Black bear	Mammals	Terrestrial	Yes	No		No	
127	<i>Oryzomys couesi</i>	Coues' rice rat	Mammals	Aquatic / Terrestrial	Yes	No		No	
131	<i>Ursus americanus luteolus</i>	Louisiana black bear	Mammals	Terrestrial	Yes	No		No	
132	<i>Leopardus wiedii</i>	Margay	Mammals	Terrestrial	No			No	
135	<i>Peromyscus truei comanche</i>	Palo Duro mouse	Mammals	Terrestrial	Yes	No		No	
136	<i>Corynorhinus rafinesquii</i>	Rafinesque's big-eared bat	Mammals	Terrestrial	Yes	Yes	Yes	Yes	This species may occur within the known range or distribution of Covered Species and could be exposed to and adversely affected by Enrolled Covered Activities.
138	<i>Lasiurus ega</i>	Southern yellow bat	Mammals	Terrestrial	Yes	Yes	Yes	Yes	This species may occur within the known range or distribution of Covered Species and could be exposed to and adversely affected by Enrolled Covered Activities.
139	<i>Euderma maculatum</i>	Spotted bat	Mammals	Terrestrial	Yes	No		No	
143	<i>Nasua narica</i>	White-nosed coati	Mammals	Terrestrial	Yes	No		No	
157	<i>Lampsilis satura</i>	Sandbank pocketbook	Mollusks	Freshwater Aquatic	Yes	No		No	
159	<i>Obovaria jacksoniana</i>	Southern hickorynut	Mollusks	Freshwater Aquatic	Yes	No		No	
164	<i>Fusconaia askewi</i>	Texas pigtoe	Mollusks	Freshwater Aquatic	Yes	No		No	
220	<i>Coniophanes imperialis</i>	Black-striped snake	Reptiles	Terrestrial	Yes	Yes	Yes	Yes	This species may occur within the known range or distribution of Covered Species and could be exposed to and adversely affected by Enrolled Covered Activities.
221	<i>Nerodia harteri</i>	Brazos water snake	Reptiles	Freshwater Aquatic	Yes	Yes	No	No	Exposure to Enrolled Covered Activities is unlikely due to its restricted range and HCP Section 6.4 measure to avoid aquatic/wetland features.
222	<i>Graptemys caglei</i>	Cagle's map turtle	Reptiles	Freshwater Aquatic	Yes	No		No	
223	<i>Trimorphodon vilkinsonii</i>	Chihuahuan Desert lyre snake	Reptiles	Terrestrial	Yes	Yes	Yes	Yes	This species may occur within the known range or distribution of Covered Species and could be exposed to and adversely affected by Enrolled Covered Activities.
224	<i>Kinosternon hirtipes murrayi</i>	Chihuahuan mud turtle	Reptiles	Freshwater Aquatic	Yes	No		No	
225	<i>Nerodia paucimaculata</i>	Concho water snake	Reptiles	Freshwater Aquatic	Yes	Yes	No	No	Exposure to Enrolled Covered Activities is unlikely due to its restricted range and HCP Section 6.4 measure to avoid aquatic/wetland features.
226	<i>Sceloporus arenicola</i>	Dunes Sagebrush Lizard	Reptiles	Terrestrial	Yes	No		No	
232	<i>Phrynosoma hernandesi</i>	Mountain short-horned lizard	Reptiles	Terrestrial	No			No	
233	<i>Leptodeira septentrionalis septentrionalis</i>	Northern cat-eyed snake	Reptiles	Terrestrial	Yes	No		No	
234	<i>Cemophora coccinea copei</i>	Northern scarlet snake	Reptiles	Terrestrial	Yes	No		No	
235	<i>Crotaphytus reticulatus</i>	Reticulate collared lizard	Reptiles	Terrestrial	Yes	Yes	Yes	Yes	This species may occur within the known range or distribution of Covered Species and could be exposed to and adversely affected by Enrolled Covered Activities.
236	<i>Coleonyx reticulatus</i>	Reticulated gecko	Reptiles	Terrestrial	Yes	No		No	
238	<i>Liochlorophis vernalis</i>	Smooth green snake	Reptiles	Terrestrial	Yes	No		No	
239	<i>Drymobius margaritiferus</i>	Speckled racer	Reptiles	Terrestrial	Yes	No		No	

Ref. No.	Scientific Name	Common Name	Taxon	General Habitat	Are impacts from Covered Activities possible? See Appendix B, Table 2, Columns 5-11	Is species likely to be exposed to a Covered Activity? See Appendix B, Table 2, Column 14	Is species likely to be exposed to an Enrolled Covered Activity? See Notes Column	Included in EIS?	Notes
241	<i>Phrynosoma cornutum</i>	Texas horned lizard	Reptiles	Terrestrial	Yes	Yes	Yes	Yes	This species may occur within the known range or distribution of Covered Species and could be exposed to and adversely affected by Enrolled Covered Activities.
242	<i>Drymarchon melanurus erebennus</i>	Texas indigo snake	Reptiles	Terrestrial	Yes	Yes	Yes	Yes	This species may occur within the known range or distribution of Covered Species and could be exposed to and adversely affected by Enrolled Covered Activities.
243	<i>Cemophora coccinea lineri</i>	Texas scarlet snake	Reptiles	Terrestrial	Yes	Yes	Yes	Yes	This species may occur within the known range or distribution of Covered Species and could be exposed to and adversely affected by Enrolled Covered Activities.
244	<i>Gopherus berlandieri</i>	Texas tortoise	Reptiles	Terrestrial	Yes	Yes	Yes	Yes	This species may occur within the known range or distribution of Covered Species and could be exposed to and adversely affected by Enrolled Covered Activities.
245	<i>Crotalus horridus</i>	Timber rattlesnake	Reptiles	Terrestrial	Yes	Yes	Yes	Yes	This species may occur within the known range or distribution of Covered Species and could be exposed to and adversely affected by Enrolled Covered Activities.
246	<i>Tantilla cucullata</i>	Trans-Pecos black-headed snake	Reptiles	Terrestrial	Yes	No		No	

Appendix B

EIS and HCP Comments and Responses

ID	Submitter	Comment	Response	HCP or EIS Change
FWS-R2-ES-2019-0016-0004	jean public	definitely opposed to this transmission line. believe it is being done by money grubbers for their own profiteering and is a dead wrong environmental horror for every other American citizens, the riches of the few and the imposition upon the many seems to be what is happening here, we all fall over dead in the us govt when rich oil men come to town with rheuir plants to know over everything environmental. Look at eh 22 species that they have no regard for. as well as the human beings who they will knock off their socks. this is about moneygrubbing, nothing else. nobody needs this project. we all need to go to solar in this part of the country immediately. there should be no action. no permit delivered. no destruction to take place for this transmission. we need to use other energy sources than these old ones which are ruining our climate.	Thank you for your comment. The EIS discloses potential social and environmental impacts associated with the proposed LCRA TSC HCP. The Service will use this information to determine whether to issue the ITP, issue the ITP with conditions, or deny the ITP.	No change.
FWS-R2-ES-2019-0016-0005	Teresa Roberts Portland, OR 97202	Please protect the Lower Colorado River from negative environmental impact and maintain water quality & cfs flows that support existing indigenous flora and fauna. #TheBuckStopsHere	Thank you for your comment. The EIS discloses potential social and environmental impacts associated with the proposed LCRA TSC HCP. The Service will use this information to determine whether to issue the ITP, issue the ITP with conditions, or deny the ITP. The proposed LCRA TSC HCP does not address the Lower Colorado River.	No change.
NA	Bill Martin, Texas Historical Commission	On p. 50, under Cultural Resources, it states: However, LCRA TSC would analyze and coordinate with NHPA to ensure compliance with the NHPA (see LCRA TSC HCP Appendix A). It should read: However, LCRA TSC would analyze and coordinate with SHPO to ensure compliance with the NHPA (see LCRA TSC HCP Appendix A).	This change was made in the EIS.	The EIS states: However, LCRA TSC would analyze and coordinate with the Service and the State Historic Preservation Office to ensure compliance with the NHPA.
FWS-R2-ES-2019-0016-0006	Texas Parks and Wildlife Department Carter Smith	<u>Chapter 3. Covered Species</u> TPWD appreciates LCRA TSC's inclusion of federally listed, or proposed for listing, plant species in the HCP. However, due to the scope of	LCRA TSC went through a process for determining the final list of Covered Species, in coordination with the Service and fully documented in the HCP, that includes	No change.

ID	Submitter	Comment	Response	HCP or EIS Change
		the Plan Area and the unknown specifics regarding the location of Covered Activities, it seems premature to eliminate wildlife and plant species from further consideration as Covered Species or species of concern. In particular, federally listed, or proposed for listing, plant species populations can be located at any time in association with Covered Species and their habitat; therefore TPWD recommends that the federally listed, or proposed for listing, plant species and associated minimization measures be reviewed and possibly expanded to include those plant species that have the potential to occur within the Plan Area and be impacted by the Covered Activities.	those species for which incidental take from the Covered Activities is reasonably certain. Take of listed plant species is not prohibited by ESA section 9. The HCP includes an amendment process and changed circumstances responses for evaluating new information and new species listings, should they arise during the Permit Term.	
FWS-R2-ES-2019-0016-0006	Texas Parks and Wildlife Department Carter Smith	<u>Chapter 4. LCRA TSC Facilities and Activities</u> On Page 27 of Section 4.1 LCRA TSC Facilities , it states, "LCRA TSC generally owns the land associated with its site-based support Facilities, but typically has only limited control or use of lands comprising the linear corridors." To that end, for those linear easements, how will LCRA TSC ensure that their minimization measures or efforts will not be adversely impacted or compromised by other management activities on and around that land?	Most of the Minimization Measures are operational adjustments of LCRA TSC's activities, and are not affected by the actions of third parties. But, in those limited circumstances where a third party could alter lands within LCRA TSC ROWs, those actions are outside of LCRA TSC's control and the effects of third party actions are not LCRA TSC's responsibility to address.	No change.
FWS-R2-ES-2019-0016-0006	Texas Parks and Wildlife Department Carter Smith	<u>Chapter 4. LCRA TSC Facilities and Activities</u> With regard to Communication Towers in Section 4.1 LCRA TSC Facilities Table 7, TPWD recommends reviewing and implementing the Federal Communications Commission advisory circular (January 6, 2017), "Opportunities to Reduce Bird Collisions with Communication Towers While Reducing Tower Lighting Costs" to minimize bird attractions to existing and newly constructed structures.	As mentioned in the HCP, LCRA TSC routinely implements best practices and other voluntary conservation measures to reduce avian collisions with its Structures. The HCP is specific to the Covered Species, and includes specific measures to reduce the risk of collisions to certain avian Covered Species.	No change.
FWS-R2-ES-2019-0016-0006	Texas Parks and Wildlife Department Carter Smith	<u>Chapter 5. Effects, Take Estimates, and Impacts</u> In Section 5.1 Effects on the LCRA TSC Activities , when referring to Houston toads on Page 43, the statement is made, "Therefore, LCRA TSC	There are no studies of potential edge effects on Houston toads. The current proposed approach for capturing the extent of take associated with indirect impacts is	No change.

ID	Submitter	Comment	Response	HCP or EIS Change
		conservatively estimates that any Indirect Habitat Modifications will only extend 50 feet beyond the limits of surface Disturbances." This is more plainly and commonly termed as edge effects from the loss of forest cover and is likely underestimated in this plan. The applicant did not provide a citation for the approximately 15 meter (50 feet) estimate. Also, the provided estimate is low compared to other published estimates of edge effects in other forest ecosystems. For example, Demaynadier and Hunter (2008) found the depth of edge effects were 25-35 meter (83-116 feet) for "management sensitive" species such as Houston toads. Given the significance of this value in calculating the conservation credit for mitigation projects, TPWD recommends that some further justification and calculation should be required with regard to edge effect impacts on Houston toads.	<p>based on the following: During their study of the Griffith League Ranch in Bastrop County, Swannack and Forstner (2004) captured 141 of 159 adult Houston toads in areas of moderate forest canopy and a "low density" of trees. The remaining 15 adult toads were found in grassland no more than 49 feet from the edge of the moderate canopy forest near a drainage leading to a consistently occupied breeding pond.</p> <p>Thus, Houston toads are commonly found in areas with moderate forest cover, indicating that "edges" in this landscape are not particularly adverse (i.e., the landscape is naturally part cover and part open).</p> <p>Futhermore, the DeMaynadier and Hunter (1998 -- we could not find a 2008 publication by these authors) may not be fully applicable in this case, since it was a study performed in a "heavily forested" region of Maine, and did not address the Houston toad. This study did include captures of the American toad (<i>Bufo americanus</i>), a species which the authors determined was not "management sensitive."</p>	
FWS-R2-ES-2019-0016-0006	Texas Parks and Wildlife Department Carter Smith	<u>Chapter 5. Effects, Take Estimates, and Impacts</u> Also in Section 5.1 regarding the whooping crane, piping plover and rufa red knot, the HCP states that indirect habitat modification will be estimated by applying a distance of 1,000 feet from areas subject to direct modification. This is based off of Koenen (1995) which found that 87% of interior least terns flushed from nests due to human activity at 984 feet. Eighty-seven percent is a large percentage of birds, and therefore, TPWD suggests that the indirect modification needs to be estimated using a	The 1,000-foot distance is appropriate for most circumstances related to these species and particularly in the case of the whooping crane. Upon further review, we note that the author of the cited reference actually reports that only 5% of incubating interior least terns flushed from the nest in response to human presence at distances greater than 300 m (984 ft). From Koenen (1995): "Overall, 82% of incubating terns flushed between 50 and 200 m. Only 5% of least	HCP Chapter 5.1

ID	Submitter	Comment	Response	HCP or EIS Change
		distance greater than 1,000 feet or there needs to be stronger justification for using 1,000-foot threshold.	terns were flushed at >300 m and only 1% flushed >350 m (Table 10)." We will update the text to reflect this error.	
FWS-R2-ES-2019-0016-0006	Texas Parks and Wildlife Department Carter Smith	<u>Chapter 5. Effects, Take Estimates, and Impacts</u> On Page 47 of Section 5.2.4 Take Estimates for Covered Species , the statement, "Although LCRA TSC derived these take estimates at the county level, LCRA TSC intends that the take allocation for a particular Covered Species may be applied anywhere across the Plan Area where needed for that species, regardless of the county-level take estimate" could cause some concern for disproportionate impacts in concentrated areas, therefore having a much greater impact on population viability than diffuse impacts across the counties that the take limits were calculated on. For example, 1,024 acres of habitat take for Houston toads would not cause problems if this were spread across the nine county range, but it could cause serious localized issues if all the activity were to take place in a single county.	LCRA TSC's Covered Activities are, by and large, linear utility corridors that do not have concentrated impacts in any one area. Similarly, LCRA TSC's site-based Facilities are also distributed across its transmission system and not concentrated. Therefore, the nature of the Covered Activities largely addresses this concern.	No change.
FWS-R2-ES-2019-0016-0006	Texas Parks and Wildlife Department Carter Smith	<u>Chapter 5. Effects, Take Estimates, and Impacts</u> TPWD recommends providing a clarifying definition of "previously modified." Is this term restricted narrowly to land previously modified solely by LCRA TSC activities and infrastructure or, more broadly, previously modified from its presumed historical condition by other land use activities other than the LCRA? Depending on the definition, whether narrow or broad, this would seem to restrict where take can occur.	LCRA TSC has revised the HCP to include a definition for the term "previously modified," as follows: "Lands where the natural vegetation has been replaced with developed land cover (including developed open spaces, such as yards or landscaping) or agricultural crops, or lands that are regularly maintained in a manner that precludes the natural progression of vegetation succession (such as regularly maintained rights-of-way)."	LCRA TSC has revised the HCP to include a definition (provided in a footnote at first usage) for the term "previously modified," as follows: "Lands where the natural vegetation has been replaced with developed land cover (including developed open spaces, such as yards or landscaping) or agricultural crops, or lands that are regularly maintained in a manner that precludes the natural progression of vegetation succession (such as regularly maintained rights-of-way)."
FWS-R2-ES-2019-0016-0006	Texas Parks and Wildlife Department Carter Smith	<u>Chapter 5. Effects, Take Estimates, and Impacts</u> In Section 5.3 Impacts of the Taking on Covered Species Table 15 on Page 49, habitat estimate values from the Buzo (2008) model are an	This model still provides a reasonable approximation of the extent of potential habitat for the Houston toad, particularly since restoration of forest cover is possible	No change.

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		overestimate of the amount of available habitat in 2019 since Buzo used National Agriculture Imagery Program (NAIP) imagery that is estimated to be at least 11 years old, if not older. Due to the 2011 Bastrop wildfire, the total available Houston toad habitat will need to be recalculated in any habitat models developed prior to the fire and adequately addressed in the take estimates for the HCP Covered Activities.	over the Permit Duration. LCRA TSC will review on-site habitat conditions when implementing the HCP that will take into account current conditions when a Covered Activity is likely to affect this species.	
FWS-R2-ES-2019-0016-0006	Texas Parks and Wildlife Department Carter Smith	<u>Chapter 6. Conservation Plan</u> TPWD recommends using native and ecotypically-appropriate seed mixes in all revegetation efforts.	As described in the HCP, LCRA TSC uses native grass/forb seed mixes for restoration purposes, considering reasonable landowner preferences for alternative species, as appropriate.	No change.
FWS-R2-ES-2019-0016-0006	Texas Parks and Wildlife Department Carter Smith	<u>Chapter 6. Conservation Plan</u> Because plants are not protected from take on non-federal lands in the ESA, activities stated in HCPs which protect plants are considered voluntary actions. These activities protect plants above and beyond what is required by law. Therefore, it is greatly appreciated that the LCRA TSC HCP has incorporated minimization measures for sixteen federally listed plant species that may be impacted by LCRA activities across the state. However, when avoidance is not possible for listed or proposed listed plant species, TPWD recommends the following additional minimization measures: <ul style="list-style-type: none"> • Surface disturbance should be avoided for all herbaceous perennial and annual species during the flowering and fruiting season to maintain population recruitment. All herbaceous perennials have this recommended minimization measure, but neither of the annuals have this measure (<i>Leavenworthia texana</i> and <i>Hymenoxys texana</i>). Additionally, only the fruiting period for <i>Spiranthes parksii</i> and <i>Callirhoe scabriuscula</i> have been listed or defined. Disturbance should be avoided for all species outside of the fruiting period. 	LCRA TSC has already proposed measures to avoid or minimize adverse impacts to listed plant species. The proposed minimization measures are intended to avoid the potential for jeopardizing the continued existence of listed plants and additional restrictions on LCRA TSC standard practices, beyond those already proposed, are not needed to satisfy this standard. In any case, LCRA TSC has agreed to coordinate with the Service to ensure that its actions will not jeopardize any listed plant species, in cases where avoidance is not practicable. The Service will provide additional conservation recommendations on specific projects to LCRA TSC to minimize impacts to listed plant species.	No change.

ID	Submitter	Comment	Response	HCP or EIS Change
		<ul style="list-style-type: none"> • Herbicide use should be avoided in and around all listed plant species populations to preserve population persistence. If herbicide use is absolutely necessary, it should be sparingly and carefully applied by hand during times of little or no wind. Only <i>Leavenworthia texana</i> incorporates avoidance of herbicides into its minimization measures. • If mowing is necessary and a plant is shorter than the maximum mower height, mower height should be adjusted to above the plant maximum height. Most species under 12 inches have been included in this minimization measure, except <i>Leavenworthia texana</i> (4 inches) and <i>Hymenoxys texana</i> (7 inches). 		
FWS-R2-ES-2019-0016-0006	Texas Parks and Wildlife Department Carter Smith	<u>Chapter 6. Conservation Plan</u> In Section 6.3.2 Participation in Other HCPs , TPWD recommends that consideration should be given to listing the Lost Pines HCP for any work on that portion of the Plan Area.	The Lost Pines HCP does not cover activities similar to the Covered Activities under the LCRA TSC HCP. LCRA TSC and other utilities already hold and implement their own, separate HCP for Houston toads in Bastrop County. As indicated in the HCP, LCRA TSC will continue to use the Four Utilities HCP for LCRA TSC activities that are reasonably certain to take the Houston toad, to the extent that the Four Utilities HCP and associated ITP provide for such coverage and LCRA TSC determines, in consideration of its other business needs, that the Four Utilities HCP and associated ITP is the best ESA compliance option for LCRA TSC activities.	No change.
FWS-R2-ES-2019-0016-0006	Texas Parks and Wildlife Department Carter Smith	<u>Chapter 6. Conservation Plan</u> In Section 6.4.1 General Minimization Measures , TPWD recommends that LCRA TSC invite TPWD Wildlife Diversity Program staff to assist in the annual training of staff and contractors, as practicable, and to include training regarding the Texas Conservation Action Plan's Species of Greatest Conservation Need (SGCN). By including training on this topic, LCRA TSC will be assisting	To best ensure that the required measures of this HCP are clearly communicated to staff and contractors, LCRA TSC wishes to tailor this training to the specific requirements of the HCP. LCRA TSC has sufficient staff and other resources to adequately perform this training.	No change.

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		in advancing knowledge and conservation opportunities for other species that may be encountered during Covered Activities.	The Service will recommend that LCRA TSC include TPWD to increase awareness of SGCN species conservation.	
FWS-R2-ES-2019-0016-0006	Texas Parks and Wildlife Department Carter Smith	<u>Chapter 6. Conservation Plan</u> TPWD recommends adding Line Markers on transmission lines that cross or travel immediately adjacent to large wetlands and other significant surface water features as well as the major rivers mentioned in Section 6.4.1 Line Markers.	The line marking measures proposed in the HCP already largely accomplishes this request, as it is not limited to only major river crossings.	No change.
FWS-R2-ES-2019-0016-0006	Texas Parks and Wildlife Department Carter Smith	<u>Chapter 6. Conservation Plan</u> Please provide references and further rationale for the 50-foot buffer used to determine the disturbance avoidance threshold related to the entrance or footprint of an occupied or assumed occupied karst feature or spring outlet or associated spring run or lake in Section 6.4.1 Occupied or Assumed Occupied Karst Features and Spring Features.	LCRA TSC selected a 50-foot buffer distance to define a “no disturbance” zone around Occupied or Assumed Occupied Karst Features and Spring Features based on a number of precedents set in other environmental guidance documents and regulatory frameworks. For example: <ul style="list-style-type: none"> • The Williamson County Regional Habitat Conservation Plan, approved by the Service in 2009, uses a distance of 50 feet to define the zone in which impacts are assumed to cause a complete loss of habitat within the karst feature (SWCA et al. 2008). • TCEQ Edwards Rules for groundwater protection prescribe a minimum buffer of 50 feet around sensitive features (i.e., including caves, solution cavities, solution enlarged fractures, sinkholes or other karst surface expression) (https://www.tceq.texas.gov/assets/public/comm_exec/pubs/rg/rg348/chapter5.pdf). • TCEQ Optional Enhanced Measures for Water Quality Protection (which address certain listed aquatic species, including some salamanders), allow for “residential yards and hiking trails” to occur within the required setbacks under these optional measures, so long as such uses do not encroach within 50 feet of a recharge 	No change.

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			<p>feature—thereby implicitly establishing a zone of 50 feet as being most essential to the integrity of the feature (https://www.tceq.texas.gov/assets/public/comm_exec/pubs/rg/rg348/rg-348a.pdf)</p> <ul style="list-style-type: none"> • TCEQ Optional Enhanced Measures for Water Quality Protection also specify setbacks of 50 feet as stream buffers for features draining less than 128 acres but 40 or more acres. Note that many springs occupied by the covered salamanders occur in or adjacent to stream channels. • The City of Austin Land Development Code contains provisions for exemptions to standard buffers around critical environmental features (including springs), so long as disturbances do not encroach within 50 feet of the feature (https://library.municode.com/tx/austin/code/s/code_of_ordinances?nodeId=TIT25LADE_CH25-8EN_SUBCHAPTER_AWAQU) <p>Therefore, this distance is adopted in the LCRA TSC HCP as a practicable measure, consistent with other frameworks, to avoid disturbances within the area where the most potentially severe impacts to karst features and springs, spring runs, etc. could occur.</p>	
FWS-R2-ES-2019-0016-0006	Texas Parks and Wildlife Department Carter Smith	<u>Chapter 6. Conservation Plan</u> On Page 71 in Section 6.6.2 Identify Relevant Covered Species , please update the name of the "TPWD County Lists of Rare Species" to "TPWD Rare, Threatened, and Endangered Species of Texas by County online application (RTEST)." 	Revised text in HCP, as requested	The requested change was made in Chapter 6.6.2.
FWS-R2-ES-2019-0016-0006	Texas Parks and Wildlife Department Carter Smith	<u>Chapter 7. Funding Assurances and Cost Estimates</u> The cost estimates in Table 18 of Section 7.2 Conservation Credit Cost Estimates and Adjustments appear low, specifically for Houston toad habitat. Generally, and in our experience, a forested tract that is good Houston toad habitat can 	LCRA TSC elected to use a consistent source for this information across the Plan Area. In addition, the HCP includes an adaptive management measure to adjust the cost estimates over time, if additional	No change.

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		be \$8,000 to \$10,000 per acre. It appears that the "Average Rural Land Market Value" statistic may be an inappropriate choice of proxies for some habitat types given the orientation of these estimators for agricultural production lands. TPWD recommends reevaluating the market value and protection costs for at least the Houston toad and also for those species whose suitable habitat occurs in close proximity to or within urban areas of the state.	information or actual experience indicates that updates are warranted.	
FWS-R2-ES-2019-0016-0006	Texas Parks and Wildlife Department Carter Smith	<u>Chapter 8. Plan Administration</u> TPWD appreciates the value of incorporating an Annual Coordination Meeting into this programmatic HCP process that will allow the Service to give timely feedback on specific upcoming Covered Activities and impacts to Covered Species. TPWD respectfully requests to be included as a participant in the Annual Coordination Meetings since many of the Covered Species are also state-listed species, and we have taxa experts that can contribute to discussions regarding minimization and mitigation measures. TPWD also requests to be a recipient of the Annual Report.	The Annual Coordination Meetings is part of a streamlined process for implementation that will focus closely on LCRA TSC's commitments in the HCP relative to the Covered Species. The Service acknowledges TPWD may have relevant information and will coordinate directly with TPWD to ensure we have the best information to inform these meetings to provide to LCRA TSC. Additionally, the Service will encourage LCRA TSC to invite representatives from TPWD to the annual meeting.	No change.
FWS-R2-ES-2019-0016-0006	Texas Parks and Wildlife Department Carter Smith	<u>Chapter 8. Plan Administration</u> To aid in the scientific knowledge of a species' status and current range, TPWD encourages LCRA TSC and their contractors to report all encounters of rare, state-, and federally-listed species to the Texas Natural Diversity Database (TXNDD) according to the data submittal instructions found on the TXNDD website. Also, we appreciate LCRA TSC's commitment to request data from the TXNDD to assist in determining the likelihood of a Covered Species to occur within or adjacent to a Covered Activity impact area. TPWD encourages LCRA TSC to also engage with specific taxa experts regarding other forms of data that may be available to assist in impact assessments.	LCRA TSC or its contractors will report observations of Covered Species to the Service, in accordance with the measures of the HCP and any surveyor permits. LCRA TSC has not proposed to monitor for other species as part of this HCP. Regarding impact assessments, the HCP already prescribes a specific framework for making these assessments.	No change.

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FWS-R2-ES-2019-0016-0006	Texas Parks and Wildlife Department Carter Smith	<u>Chapter 8. Plan Administration</u> With regard to LCRA TSC's request for the Service to authorize an ITP initial term of 30 years (Section 8.4.2 Permit Term, Renewals, and Suspensions or Revocations), TPWD recommends that the Service authorize a reduced term ITP for 15 years with the option to renew at the end of the term. TPWD appreciates LCRA TSC's efforts to design a conservation program that utilizes many aspects of a traditional HCP as well as new, and as of yet, untested processes to minimize and mitigate impacts to the Covered Species. However, TPWD has concerns about LCRA TSC's abilities to complete mitigation in advance of impacts and their assumption that Post-Enrollment Mitigation will be rare.	The HCP includes adaptive management and changed circumstances that address this uncertainty.	No change.
FWS-R2-ES-2019-0016-0006	Texas Parks and Wildlife Department Carter Smith	<u>General Comment</u> Please make the following document publicly available: SWCA Environmental Consultants (SWCA). 2018. <i>Best available science summary for LCRA Transmission Services Corporation Habitat Conservation Plan covered species</i> . Prepared for LCRA Transmission Services Corporation. Austin, Texas. XXX pp. It is referenced many times throughout the HCP, but TPWD is unable to locate a copy to provide context to referenced statements.	LCRA TSC has provided a copy of this document to the Service, and it is part of the administrative record for the related EIS. The Service will provide this document to TPWD.	No change.
FWS-R2-ES-2019-0016-0006	Texas Parks and Wildlife Department Carter Smith	<u>Appendix B — Species of Concern Review</u> In Appendix B. Table 1 and 2 , several species with active petitions for listing consideration were evaluated; however only a single petitioned species, the spot-tailed earless lizard (STEL; <i>Holbrookia lacerata</i>) is listed as a Covered Species. TPWD is concerned that the justification for not including other petitioned species, particularly terrestrial species with similar impact assessment scores as the STEL, has been insufficiently documented and/or articulated. Also, it should be noted that the STEL has two recognized subspecies, <i>Holbrookia lacerata lacerata</i> and <i>Holbrookia lacerata subcaudalis</i> , with	Petitioned species are not protected by the ESA and there is no certainty when or if listing will occur. The HCP includes changed circumstances provisions for addressing new species listings. Regarding spot-tailed earless lizards, the HCP names the species as a whole as the taxa included as a Covered Species, which includes both sub-species. If this species or one of the subspecies becomes listed in the future, LCRA TSC may use the changed circumstances provisions to clarify the taxonomic entity that is a Covered Species.	No change.

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		different population densities (Roelke et al. 2018) that should be addressed in the Covered Species evaluation and impact assessment.		
FWS-R2-ES-2019-0016-0006	Texas Parks and Wildlife Department Carter Smith	<u>Appendix B — Species of Concern Review</u> Desert massasauga (<i>Sistrurus catenatus/tergeminus edwardsi</i>) is not included in the evaluation found in Appendix B Table 1 and 2 . This is a petitioned taxon, and the listing decision will likely depend on the results of ongoing genetics research (Ryberg et al. 2015). This species occurs extensively within the HCP's Plan Area, and the Covered Activities are likely to have significant impacts on this species. TPWD recommends evaluating this species and including it as a Covered Species.	The LCRA TSC HCP Chapter 9 includes a changed circumstance that addresses the situation of future new species listed that may be affected by the Covered Activities.	No change.
FWS-R2-ES-2019-0016-0006	Texas Parks and Wildlife Department Carter Smith	<u>Appendix B — Species of Concern Review</u> In Appendix B Table 2 , impacts to the western chicken turtle (<i>Deirochelys reticularia miaria</i>), a petitioned species with a substantial 90 day finding, are underestimated due to the sole focus on impacts to aquatic habitats and without regard to potential terrestrial habitat impacts. This species is active on land after the spring aquatic activity season. Any surface, or particularly subsurface, disturbances from May to December could directly impact western chicken turtles in the terrestrial landscape (McKnight et al. 2015). The species' historical range occurs across the eastern half of the state and within the HCP's Plan Area. TPWD recommends further evaluating this species and including it as a Covered Species.	The LCRA TSC HCP Chapter 9 includes a changed circumstance that addresses the situation of future new species listed that may be affected by the Covered Activities.	No change.
FWS-R2-ES-2019-0016-0006	Texas Parks and Wildlife Department Carter Smith	<u>Appendix B — Species of Concern Review</u> Also, in Appendix B Table 2 , impacts to the black-spotted newt (<i>Notophthalmus meridionalis</i>), a petitioned species with a substantial 90 day finding, are underestimated due to the sole focus on impacts to aquatic habitats and without regard to potential terrestrial habitat impacts. Black-spotted newts occupy aquatic habitats when they are seasonally available but otherwise can occur in terrestrial	The LCRA TSC HCP Chapter 9 includes a changed circumstance that addresses the situation of future new species listed that may be affected by the Covered Activities.	No change.

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		surface or subsurface habitats. They occur in coastal counties and are likely to be encountered and impacted during Covered Activities within the Plan Area. TPWD recommends further evaluating this species and including it as a Covered Species.		
FWS-R2-ES-2019-0016-0006	Texas Parks and Wildlife Department Carter Smith	<u>Appendix D — Background, Analysis, and Conservation Measures for Covered Species</u> On Page STEL-2 of Appendix D under Presence/Absence Surveys , it says, "The delineation of Suitable Habitat (with assumed occupancy) can be refined to Occupied or Unoccupied Habitat based on a single year of survey results completed no more than three survey seasons prior to the start of Covered Activities." TPWD is concerned that detection probabilities will not be high enough for "a single year of survey results" to confirm or refute occupancy. Determining occupancy for this species will depend on the level of effort, environmental conditions during the year and surveys, and the population size of lizards in the year the surveys are performed. TPWD recommends contacting the TPWD state herpetologist to engage in further discussions on what survey effort may be appropriate to determine STEL occupancy.	LCRA TSC intends to rely primarily on assessing impacts on the basis of Suitable Habitat or Occupied Habitat (based on previously documented observations), and expects presence/absence surveys will be rare.	No change.
FWS-R2-ES-2019-0016-0006	Texas Parks and Wildlife Department Carter Smith	<u>Appendix D — Background, Analysis, and Conservation Measures for Covered Species</u> On Page STEL-2 of Appendix D under Presence/Absence Surveys , it says that, "Unoccupied Habitat is all Suitable Habitat more than 150 feet from a STEL detection recorded within the prior 3 years. " However, areas outside of 150 feet from a STEL detection are likely occupied as they are in the same contiguous habitat patch. Even if these habitats are only infrequently used (i.e. for dispersal, brumation, etc.), and therefore difficult to observe STEL use directly, these habitat patches can be critical to	The distance of 150 feet around a detection is the approximate size of a home range for other similar lizard species. The typical size of a spot-tailed earless lizard home range is not known, but other species in the family tend to have relatively small home ranges of 1.2 to 1.5 acres (WildEarth Guardians 2010). Therefore, this is a reasonable approximation of the extent of occupied habitat based on actual detections.	No change.

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		individual persistence. Thus, removal of these habitats may constitute a form of take via harm.		
FWS-R2-ES-2019-0016-0006	Texas Parks and Wildlife Department Carter Smith	<u>Appendix D — Background, Analysis, and Conservation Measures for Covered Species</u> In Appendix D, multiple taxa, such as spring-adapted <i>Eurycea</i> salamanders , Comal Springs riffle beetle, Peck's cave amphipod, northern karst invertebrates, and southern karst invertebrates, have Specific Minimization Measures listed that include erosion and sediment controls. Because the mesh found in many erosion control blankets or mats poses an entanglement hazard to wildlife, TPWD recommends the use of no-till drilling, hydromulching and/or hydroseeding due to a reduced risk to wildlife. If erosion control blankets of mats will be used, TPWD recommends erosion and sediment control materials used by LCRA TSC to be loosely woven, natural fiber netting in which the mesh design allows the threads to move, therefore allowing expansion of the mesh openings. Plastic mesh matting should be avoided.	LCRA TSC uses natural fiber netting in certain circumstances, but it is not practicable across the board. Furthermore, the body size of these terrestrial and aquatic karst-associated species are much smaller than the weave size in these materials, and it seems unlikely that they would become entangled. The Service will make recommendations to LCRA TSC consistent with TPWD's request on specific projects in these species' habitats.	No change.
FWS-R2-ES-2019-0016-0006	Texas Parks and Wildlife Department Carter Smith	<u>Appendix G - Analysis of Jeopardy and Destruction or Adverse Modifications of Critical Habitat for Federally Listed Species</u> The Technical Memorandum states plant surveys will not occur, but the General Minimization Measures for listed plants indicate surveying will at least be considered after general minimization measures are attempted. These two statements seem to contradict one another. Please review and clarify as needed. Also, TPWD recommends further review of other inconsistencies we noted in the minimization measures for federally listed or proposed for listing plant species in Table 1 of Appendix G.	LCRA TSC does not anticipate performing surveys for plants under most circumstances. Performing a survey for listed plants is only one of several potential additional minimization measures that may be warranted to avoid jeopardizing the continued existence of a listed plant species.	No change. Some listed or proposed for listing plants do not have exposure to the Covered Activities and, therefore, are not specifically addressed in General Minimization Measures for Listed Plants in the HCP text. Nonetheless, LCRA TSC endeavors to implement other minimization measures for these plants associated with its other activities, where practicable. Those voluntary measures are highlighted in the JAM appendix language. The measures for listed or proposed for listing plants that do have exposure to Covered Activities match the text in the HCP.

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FWS-R2-ES-2019-0016-0006	Texas Parks and Wildlife Department Carter Smith	<p>In Section 2.1.8.1 Minimization Measures, the dEIS notes a "general measure" of marking lines that occur within the whooping crane "80-mile" migration corridor. TPWD recommends that the regions within the Plan Area subject to line marking be informed through the permit term by current knowledge of whooping crane migration routes, as the population is expanding and has exhibited detectable changes in migration routes. For example, please review Pearse et al. (2018).</p> <p>As previously mentioned in the HCP comments section of this letter, TPWD recommends and supports Alternative B - Reduced Permit Duration and Section 2.2 should acknowledge that the 15-year ITP could be renewed for another term.</p>	<p>Thank you for your comment. Section 2.2 has been revised to acknowledge that the 15-year ITP could be renewed for another term.</p> <p>LCRA TSC will consult with the Service during the annual coordination meeting to determine new records of the species and to determine whether any marking is required if projects occur near these locations, therefore no change to the whooping crane general measure was made at this time.</p>	<p>New sentence added:</p> <p>The Service could choose to renew the ITP for another term.</p>
FWS-R2-ES-2019-0016-0006	Texas Parks and Wildlife Department Carter Smith	In Section 3.4 Covered Species Table 8, it should be noted that the spot-tailed earless lizard has two recognized subspecies, <i>Holbrookia lacerata lacerata</i> and <i>Holbrookia lacerata subcaudalis</i> , (Roelke et al. 2018) that should be addressed in this table and elsewhere in the document, as needed.	This clarification was made in the EIS.	<p>New footnote: The spot-tailed earless lizard has two recognized subspecies, <i>Holbrookia lacerata lacerata</i> and <i>Holbrookia lacerata subcaudalis</i>. Hereafter, all discussion of this species in the EIS encompasses both subspecies.</p>
FWS-R2-ES-2019-0016-0006	Texas Parks and Wildlife Department Carter Smith	In Section 3.7.1 General Wildlife Table 10 is entitled "Ecoregions within the Plan Area with Associated Common Wildlife." However, Table 10 includes many species that are not common, including species listed under the ESA (e.g., prairie chickens (<i>Tympanuchus spp.</i>), Louisiana pine snake (<i>Pituophis ruthveni</i>), and Houston toad (<i>Anaxyrus houstonensis</i>)). TPWD believes the inclusion of these rare species in Table 10 is useful in characterizing and distinguishing between unique ecoregions in Texas; however TPWD suggests renaming Table 10 to omit "Common" from the title.	This revision was made in the EIS.	"Common" was deleted from General Wildlife Table 10 heading.
FWS-R2-ES-2019-0016-0006	Texas Parks and Wildlife Department	In Section 4.2.1 Quantification of Impacts, please clarify the rationale associated with why the total estimated acres of impact only included surface	The biotic resources category covers all Covered Species that use surface terrestrial habitats, i.e., reptiles, mammals, birds, and	<p>New bullet added:</p> <p>Karst invertebrates: Total estimated acres of impact was calculated by</p>

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	Carter Smith	terrestrial habitats and not subsurface habitat impacts. Almost half of the Covered Species occur in subterranean habitats.	the Houston toad (<i>Anaxyrus</i> [formerly <i>Bufo</i>] <i>houstonensis</i>). Covered karst invertebrates also use subsurface habitat and subsurface impacts were incorporated into estimates of take. A third bullet was added in Section 4.2.1 to clarify and address impact quantification for this species group.	summing incidental take of all Covered Species that use surface and subsurface terrestrial habitats.
FWS-R2-ES-2019-0016-0006	Texas Parks and Wildlife Department Carter Smith	In Section 4.4.2.1 Surface Waters, the dEIS, "LCRA TSC would, per the LCRA TSC HCP and typical PUC requirements, minimize such disturbances to the extent necessary to safely perform the Covered Activity, and revegetate and restore disturbed areas to preconstruction contours with a seed mix certified by the USDA and approved by the landowner, with a priority on native mixes." TPWD also recommends LCRA TSC commit to seeding ecotypically-appropriate seed mixes in all revegetation efforts. TPWD also recommends that LCRA TSC commit to incorporating pollinator conservation and management into the revegetation and maintenance plans for all Covered Activities.	As described in the HCP, LCRA TSC uses native grass/forb seed mixes for restoration purposes, considering reasonable landowner preferences for alternative species, as appropriate, which in many cases will also benefit pollinator species. Therefore, although LCRA TSC acknowledges TPWD's request, no change in seed mix commitment was made in the HCP and associated EIS.	No change
FWS-R2-ES-2019-0016-0006	Texas Parks and Wildlife Department Carter Smith	In Section 4.4.3 Covered Species Table 16 provides a summary of impacts to Covered Species. TPWD notes an error in the amphibians section of the table. The fourth bullet point on page 48, relating to habitat fragmentation and edge effects on Eurycea salamanders, references two invertebrate species (Comal Springs riffle beetle and Peck's Cave amphipod).	These two species references were removed from this section.	The following text was deleted: Covered Activities would largely avoid surface aquatic habitats and are unlikely to fragment or introduce edge effects to Comal Springs riffle beetle (<i>Eurycea</i> sp. 8) or Peck's Cave amphipod (<i>Stygobromus pecki</i>) habitat. Limited subsurface excavations would not fragment the highly interconnected passages of the karst aquifer.
FWS-R2-ES-2019-0016-0006	Texas Parks and Wildlife Department Carter Smith	Also, Table 16 regarding the spot-tailed earless lizard states "Covered Activities could replace some areas of suitable habitat for spot-tailed earless lizard (<i>Holbrookia lacerata</i>) with structure foundations. However, these activities could also enhance existing habitat or create new habitat by causing	This bullet was clarified; a scientific reference was also added.	Replaced bullet with: Covered Activities could replace some areas of suitable habitat for spot-tailed earless lizard (<i>Holbrookia lacerata</i>) with structure foundation, but vegetation clearing and soil

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		disturbances that promote bare ground and short vegetation." TPWD recommends further clarification and scientific references for this rationale.		disturbance could also promote sparse, short herbaceous vegetation and small areas of disturbed soils that are used by the species to burrow, forage, and thermoregulate once construction is complete (TPWD 2017i).
FWS-R2-ES-2019-0016-0006	Texas Parks and Wildlife Department Carter Smith	Also, Table 16 regarding karst invertebrates states, "Vegetation and soil disturbances associated with the Covered Activities could facilitate the invasion or proliferation of red imported fire ants (<i>Solenopsis invicta</i>), which the Service (2011) identifies as a threat to endangered karst fauna via predation or competition." TPWD recommends adding tawny crazy ants (<i>Nylanderia fulva</i>) to the summary of potential direct and indirect impacts for these species.	A reference to tawny crazy ants was added to the summary of potential direct and indirect impacts for these species.	Added to existing bullet: Vegetation and soil disturbances associated with the Covered Activities could facilitate the invasion or proliferation of tawny crazy ants (<i>Nylanderia fulva</i>) and red imported fire ants (<i>Solenopsis invicta</i>), which represent a threat to endangered karst fauna via predation or competition (Service 2011a).
FWS-R2-ES-2019-0016-0006	Texas Parks and Wildlife Department Carter Smith	Again regarding karst invertebrates, Table 16 states, "Clearing trees from ROWs could degrade karst habitat by altering the amount or composition of nutrient inputs to the subsurface environment or altering the subsurface climate through additional sun exposure at the ground surface." All vegetation in the vicinity of caves and karst features is important for the karst ecosystem. TPWD recommends revising this language to state "clearing vegetation" instead of "clearing trees." Also, TPWD recommends adding the following language as potential direct or indirect impact to karst invertebrates, "Removal of surface vegetation in the vicinity of caves and karst features could also adversely impact an important function of these features in that they provide habitat and food for the animal communities that contribute nutrients to the karst ecosystem (such as cave crickets, small mammals, and other vertebrates)."	No change was made to the language in Table 16 of the EIS from "clearing trees" to "clearing vegetation". Clearing vegetation could include mowing, which would not cause adverse effects. The EIS was revised to include the proposed wording changes regarding potential direct or indirect impact to karst invertebrates.	The EIS was revised to include the proposed wording changes regarding potential direct or indirect impact to karst invertebrates.

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FWS-R2-ES-2019-0016-0006	Texas Parks and Wildlife Department Carter Smith	Overall, with regard to Table 16 and potential direct and indirect impacts, TPWD recommends including references to support rationale as to why the intensity of a particular impact would be less or more for a particular species, such as ocelot and Houston toad.	<p>Potential direct and indirect effects to Covered Species from Covered Activities are described in LCRA TSC HCP Chapter 5 and Appendix D, but also briefly summarized in Table 16 for reader convenience.</p> <p>LCRA TSC's requested take is very small as a percentage of total amount of habitat within range of each Covered Species. In fact, for many Covered Species, the requested take is less than 0.2%, and the maximum is only 0.7%. Further, given the programmatic nature of the HCP, impacts to specific species would vary depending on the Covered Activities and location of projects that LCRA TSC chose to enroll in the HCP. Therefore, this EIS does not assign impact intensity by species, but instead presents the range of potential impacts that could occur. Additional references have been added where they further support impact statements.</p>	Additional references have been added where they further support impact statements.
FWS-R2-ES-2019-0016-0006	Texas Parks and Wildlife Department Carter Smith	For Section 4.4.6 Non-Federally Listed Species under Migratory Birds, TPWD recommends adding the following language, "TPW Code Section 64.002, regarding protection of nongame birds, provides that no person may catch, kill, injure, pursue, or possess a bird that is not a game bird. TPW Code Section 64.003, regarding destroying nests or eggs, provides that, no person may destroy or take the nests, eggs, or young and any wild game bird, wild bird, or wild fowl. TPW Code Chapter 64 does not allow for incidental take and therefore is more restrictive than the MBTA." TPWD also recommends a commitment to avoid vegetation clearing activities during the general bird nesting season, March 15 through September 15, if feasible. Additionally, it is not clear to TPWD why following	EIS Section 4.4.6 has been revised to recognize the existence of Texas Parks and Wildlife Code Section 64.002, relating to the Texas Parks and Wildlife Department's treatment of non-game bird species. The minimization and mitigation measures required under the conservation program of the HCP likely will benefit state non-game bird species that are present or have habitat in the immediate vicinity of Covered Activities or in areas conserved pursuant to the HCP. LCRA TSC will comply with applicable federal, state, and local law when undertaking Covered Activities.	<p>New language added: TPW Code Section 64.002, regarding protection of nongame birds, provides that no person may catch, kill, injure, pursue, or possess a bird that is not a game bird. TPW Code Section 64.003, regarding destroying nests or eggs, provides that, no person may destroy or take the nests, eggs, or young and any wild game bird, wild bird, or wild fowl.</p> <p>Birds protected by the MBTA occur in every habitat type in the United States, and nests occur in trees and on forest floors, in</p>

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		<p>the APLIC guidelines or the use of vulture depredation permits will provide avian protection to nests and nestlings. Please clarify. Also, nest relocation, particularly of passerine species, is not recommended and should be only implemented as a last resort.</p> <p>For Section 4.4.6 Non-Federally Listed Species under State-listed Species, TPWD recommends that LCRA TSC actively engage with our department to identify conservation measures to support recovery actions for state-listed species that are not Covered Species but may be directly or indirectly impacted by Covered Activities.</p>	<p>LCRA TSC takes the necessary steps to comply with the Migratory Bird Treaty Act, and to the extent reasonable, minimizes vegetation clearing activities during the general bird nesting season; however, some of the Covered Species in this HCP have seasonal restrictions that conflict with the general bird nesting season. In order to minimize effects of Covered Activities on the Covered Species, LCRA TSC may clear vegetation during the general bird nesting season to avoid clearing vegetation at a time or times that would cause adverse effects on Covered Species.</p> <p>Language regarding APLIC and other LCRA TSC measures was intended to reflect standard operating procedures to minimize avian impacts, but not specific to nest/nestlings. This section has been revised to clarify impacts.</p>	<p>grassland or shrubland, uplands and wetlands. Covered Activities have the potential to destroy active nests and eggs, kill individual birds, and modify habitat used by migratory birds for breeding, feeding, and sheltering. Adult birds capable of flight are likely to avoid most construction, maintenance, operations, and decommissioning activities. However, adult birds could collide with transmission lines and may be vulnerable to electrocution. LCRA TSC would follow procedures for avian protection as outlined by the Avian Power Line Interaction Committee (APLIC) (APLIC and Service 2005; APLIC 2006, 2012), as feasible, to minimize collision and electrocution risks.</p> <p>Destruction of eggs and the killing of young birds not yet able to fly could occur during activities that modify nest sites. However, LCRA TSC will comply with applicable federal, state, and local avian laws pertaining to its activities, including the MBTA. In addition, the minimization and mitigation measures required under the LCRA TSC HCP will benefit avian species—including unlisted migratory and state non-game bird species—in ways similar to Covered Species under the LCRA TSC HCP. Therefore, impacts to migratory bird</p>

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				individuals or nests would be minor in nature.
FWS-R2-ES-2019-0016-0006	Texas Parks and Wildlife Department Carter Smith	In Section 4.4.6 Table 17, the second bullet under "Mammals" is confusing and needs clarification.	Revised language to improve clarity:	Revised language: Noise and activity disturbances could displace or disturb Rafinesque's big-eared bat; this species is very intolerant of disturbance and could abandon roost sites or hibernation sites if subjected to disturbance (Trousdale et al. 2008).
FWS-R2-ES-2019-0016-0006		In Section 4.4.6 Table 17, TPWD recommends listing human-induced mortality or the direct killing of snakes as a potential direct impact. Unfortunately it is common for construction personnel to kill snakes, irrespective of whether they are venomous, as they perceive them as a threat to personal safety.	This issue was added as a potential direct impact in Table 17.	New bullet: Intentional or accidental injury or mortality of snakes by humans is also a potential direct impact.
By Mail	Environmental Protection Agency	No comment	N/A	No change